

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING



Microsoft to peek into Win95 PCs

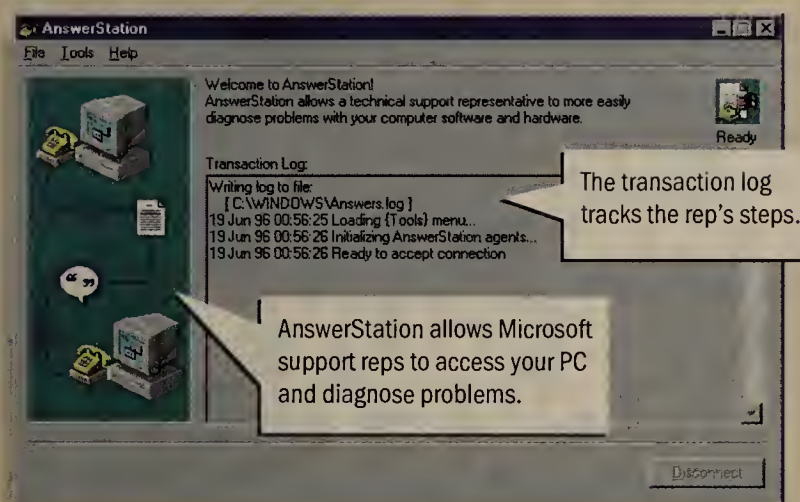
By Christine Burns
Redmond, Wash.

Got a problem with your Windows 95 desktop? Microsoft Corp. will soon have a faster way to help you address it.

When the company rolls out its first revision of Windows 95 later this year, it will include a feature called AnswerStation, an agent that allows Microsoft Technical Support personnel to dial in to customers' Windows 95 PCs to diagnose problems.

The upgrade will also allow for easier installation of network cards and feature enhanced ISDN support. In addition, it will enable image scanning, include a built-in Web browser and boast support for a wider range of hardware, including larger shared disk drives.

WINDOWS 95 TO LET MICROSOFT SEE YOUR PC



AnswerStation is the most intriguing new feature, though observers said it could raise concerns among customers. Some

customers complained last year around the time Windows 95 first shipped that Microsoft was

See Windows 95, page 84

MCI quadruples 'Net backbone

Carrier boosts 'Net capacity from 155M to 622M bit/sec.

By David Rohde
and Joanie Wexler
Washington, D.C.

No one can accuse MCI Communications Corp. of not doing its part for the Internet decongestion cause.

The carrier plans to reveal today that it has undertaken another upgrade of its 'Net backbone — this time to a whopping OC-12 (622M bit/sec) — in a \$60 million initiative, company spokespeople said. Just last month, MCI raised the backbone speed to 155M bit/sec.

Part of MCI's incentive could

be that it is still stinging from criticism about its recent moratorium on dedicated Internet

See MCI, page 83

Link up with Network World Fusion
for more info, including:

- A look at the problems that shut down Internet service provider Netcom last week
- Articles on other Internet bandwidth issues
- Papers on carrier pricing plans for multimedia traffic

NetworkWorld

Select News+
then Front Page.

Fusion
<http://www.nwfusion.com>

Frame relay on the cheap

Andrew switch to support multiprotocol backbone nets.

By Michael Cooney
Orland Park, Ill.

Andrew Corp. thinks you're paying too much for frame relay, so the 55-year-old outfit is prepping a switch that reportedly cuts the cost of building private frame relay nets in half.

The company's first entry into the frame relay market, SwitchLynx/FR, enables users to build a backbone network capable of supporting multiprotocol data, voice and video, the company claimed.

Andrew is aiming its aggressively priced SwitchLynx/FR right at market leaders Cascade Communications Corp., Newbridge Networks, Inc. and StrataCom, Inc.

"Until this point, customer

FRAME RELAY FACTS

1995 frame relay switch market: \$680 million

Market growth rate to year 2000: 26% (compounded annually)

Top three vendors: StrataCom, Cascade, Newbridge

SOURCE: IDC, FRAMINGHAM, MASS.

premises equipment prices kept many users from setting up private frame relay networks, and we now are trying to make that option more economical," said Ali Safari, product manager with Andrew.

Analysts think Andrew may be onto something.

See Andrew, page 83

Vendors ease R/3 hassles

By Jim Duffy

It's reportedly costing Digital Equipment Corp. \$50 million. Baxter International, Inc. is paying up to \$34 million. And 3Com Corp. is said to be spending \$10 million on it.

"It" is the SAP AG R/3 client/server application environment — the popular but complicated business reengineering tool that's sweeping across corporate America. R/3 has caught on

because it provides companies with a suite of financial, human resources and manufacturing applications that can take advantage of the "cheap MIPS" available on distributed systems.

But it is costing companies a small fortune to roll out the software.

What's needed are tools for implementing and customizing the software more easily and for less money than can be done with SAP's Computing Center



Management System (CCMS).

"There's a void in the [R/3] tools market," said Chip McAvoy, lab manager at systems management vendor Platinum Technology, Inc. in Oakbrook Terrace, Ill. "Whoever solves this is going to make a ton of cash."

Platinum is hoping to cash in, but it will have to contend with the likes of Computer Associates International, Inc. (CA), Hewlett-Packard Co. and IBM.

The vendors are expected to focus on helping companies customize R/3 applications through software distribution, event management and end-to-

See SAP, page 16

SMS gains OpenView link

By Michael Cooney
Raleigh, N.C.

Sometimes it takes a little guy to do a big guy's job.

NetTech, Inc. is getting ready to fill in key gaps in Microsoft Corp.'s Systems Management Server (SMS), as well as Hewlett-Packard Co.'s OpenView and IBM/Tivoli Systems, Inc.'s Tivoli Management Environment (TME) 10 management offerings.

The new software, EView/

SMS and EView/400 for the AS/400, lets users combine systems and network management data from disparate distributed networks onto a single HP OpenView management console. EView/SMS takes details about desktops from SMS and feeds them to OpenView.

EView is a set of management software that lets users monitor the performance of complex, multivendor networks and help

See NetTech, page 83

NETTECH PROFILE

Founded: 1990 (by ex-IBMers)

Headquarters: Research Triangle Park, N.C.

Primary products: EView family of network and system management software including EView/SNA, EView/SMS, EView/Open, EView/400, NDM/View.

Major development partners: Cisco, Castles, and others.

**THIS IS
YOUR
COMPANY.**

**YOU NEED
TO FIND
A MESSAGE
THAT'S IN
ONE GUY'S
POCKET.**

**YOU HAVE
HALF A
SECOND.**

AltaVista™ is the fastest, hungriest search engine on the Internet, the first that can index every word of every available Web page (15 billion words, 30 million pages so far), delivering results almost instantly, even listing the

**TEST DRIVE THE FASTEST SEARCH
ENGINE ON THE HIGHWAY.
[HTTP://WWW.ALTAVISTA.DIGITAL.COM](http://www.altavista.digital.com)**



most relevant sites first. Since it surely takes you longer to search through less stuff in your company's data, you're probably asking, "When can we have an AltaVista around here?" And the answer is, "Right now." AltaVista is a Digital invention, and its technology is ideal for corporate intranets. So we're making it available to your business, to give your people unparalleled access to information, to make your company's network as responsive and

digital™

WHATEVER IT TAKES™

easy-to-use as the Internet at its best.

To learn more, first try AltaVista at the

address above, then visit our software Web site at [http://www.](http://www.altavista.software.digital.com)

altavista.software.digital.com or call 1-800-336-7890.

**NOW YOU
KNOW
WHY WE
INVENTED
ALTAVISTA
SEARCH.**

going freelance:

Former systems and technology businesses of AT&T.

Experts in making the things that make communications work

forming new company after 125 years.

Bell Labs coming with us.

Can start right away. Call Lucent Technologies.



This Week



News+

The Front Page

- **SAP:** Download R/3 primers and pick up tips on how to interview for an SAP-related job.
- **The Internet:** Read our front-page story on MCI's Internet bandwidth woes, then come to Network World Fusion for additional articles on Internet congestion, including a look at what led to the shutdown of Internet service provider Netcom last week.

- **Network management:** Check out our links to net management white papers and primers.

The Technical Sections

- **LAN switching:** Looking to upgrade your LAN? Download any of several Buyer's Guides and Reviews to hubs and switches, in Local Networks.
- **Workflow:** Pick up a workflow primer, then download a guide to vendors and one analyst's checklist for using workflow to reengineer your business processes, in Client/Server Applications.
- **The Web:** Can't get through to your favorite Web sites because everybody else is clogging the bandwidth? Download beta and evaluation copies of a variety of offline browsers that can retrieve Web documents in the off-hours, in Intranets & the 'Net.



NetRef

- Download complete test results for the servers reviewed on page 63. Select Buyer's Guides and Reviews, then Server Test Series.

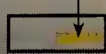
this week's pick



The Unix Guru Universe is about as complete a guide to Unix resources as you'll find anywhere on the 'Net. Look for scores of links to everything from primers and tutorials to downloadable networking tools and vendor lists, at <http://www.ugu.com>.

HOW TO GET ON TO NETWORK WORLD FUSION

At the welcome screen, click on First Visit and follow the instructions. Subscribers, keep your NWF number — highlighted on the front cover's mailing label — handy during registration. Non-subscribers must fill out an on-line registration form.



Hot Topic

Read Buerger on Internet spiders (page 85), then add your opinion.

Select Forum, Columnists then Buerger.

Contents

News

- 6 **IBM and Microsoft** separately demonstrate clustering.
- 8 **CrossComm focuses** on management, reliability and price with Ethernet.
- 8 **Experts debate** ATM's role in the background.
- 10 **Rivals HP, IBM** join forces to help customers monitor applications.
- 10 **Microsoft and Cisco** both want bragging rights to secure Internet protocol.
- 10 **Lotus plans** Notes-based Web servers that use Internet-only standards.
- 14 **Bay snaps up** Penril modem group for \$120 million.
- 14 **Shiva's acquisition** of AirSoft could result in cheaper remote access.
- 84 **Microsoft has** a healthy new Outlook on messaging.

WANs & Internetworking

- 19 **Sterling adds** new features to enterprise management pack.
- 19 **Bay rolls out** new ISDN PRI access server.
- 19 **Compuware unveils** new version of EcoNet.
- 20 **ADSL gets** a burst of speed from AT&T Paradyne.

SPECIAL FOCUS
Network operating systems

The NOS vendors are eyeing intranet riches.
Page 34.

Carrier Services

- 25 **NASA is looking** for cheap thrills from Sprint's ATM.
- 25 **AT&T Wireless slashes** CDPD prices, but will managers finally buy?
- 25 **Bell Atlantic offers** local service soon, with eyes on long-distance VPN.

Local Networks

- 29 **3Com adds high-end** features to stackable switching hubs.
- 29 **Intel introduces** Fast Ethernet products for new and old cabling plants.

Client/Server Applications

- 39 **The workflow market** is slowing down, report says.
- 39 **New tools marry** Web pages with back-end data.
- 39 **Worldtalk enhances** NetJunction mail connectivity tool with management and 'Net modules.

Intranets & the 'Net

- 43 **Stac looks** for fortune on the info highway.



Richard Cogger (left) and Phillip Emer debate *Cells in Frames* — Does it make sense for ATM to the desktop? Page 53.

Technology Update

- 47 **Standard for carrying** multiprotocol data over ATM shapes up.

Management Strategies

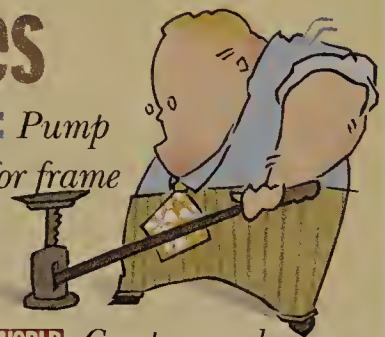
- 66 **Help is on the way** for users looking to learn how to integrate Unix with Windows NT.
- 66 **Check out** the latest Network Book Report.

Opinions

- 23 **Scott Bradner** denounces Internet death sentence.
- 30 **Skip MacAskill and Melinda Le Baron** knock Bay for bad timing.
- 32 **Dave Kearns** questions the openness of Microsoft's new file-sharing technology.
- 42 **Daniel Blum** says the messaging industry price war has a dark side.
- 48 **Editorial:** Take it easy, AT&T.
- 48 **Linda Musthaler** says 'wait and see' is the way to go with gigabit Ethernet.
- 85 **Dave Buerger:** Robots, spiders and broadcast technologies have their costs.
- 85 **Mark Gibbs:** Bringing the fun back into networking, whether the users like it or not.

Features

Mux migration: Pump up your muxes for frame relay and ATM duty. Page 55.



NetworkWorld PC WORLD SERVER TEST SERIES

Compaq and Acer offer up strong workgroup models. Page 63.

Network Help Desk. Page 47.

Message queue. Letters to the editor. Page 49.

Editorial and advertiser indexes. Page 82.

NetworkWorld's Mission: To provide news and analysis that help network IS professionals deliver the network computing infrastructure and distributed applications required to meet evolving business needs.

News briefs, June 24, 1996

Audit time

■ As in the real world, if you don't pay your taxes in the virtual world, the government is bound to ferret you out. This week, 25,000 individual, corporate and nonprofit Web sites and electronic mail addresses will disappear from the Internet as the result of an audit by SAIC Network Solutions, Inc. The company, a government contractor, whose role since 1993 has been to register and monitor domain names on the 'Net, runs InterNIC. Users are required to pay InterNIC an initial fee of \$100 for the first two years and a yearly sum of \$50 thereafter to keep their domain names up and running.

Slam dunk for Bay, Lucent and AT&T

■ Off the switching hub, through the ATM switch, over the frame relay backbone and nothing but net. That's the way traffic will be flowing at the National Basketball Association's New York headquarters and Secaucus, N.J., office following Lucent Technologies, Inc.'s installation of an Asynchronous Transfer Mode backbone. Lucent installed under a distribution agreement Bay Network, Inc.'s System 5000 and Centillion Networks, Inc.'s 100 LAN/ATM switches to anchor a 155M bit/sec ATM backbone net at each site linked by a T-3 metropolitan-area connection. Applications will include full-motion video and digitized photos, as well as Lotus Development Corp.'s Notes. The NBA plans to link its 29 teams and eight international offices to the network through AT&T's InterSpan frame relay and other services.

NetManage gets Maximum exposure

■ NetManage, Inc. in Cupertino, Calif., which has made intranet tools a priority, last week bought technology to manage internal Webs. NetManage acquired Maximum Information, Inc. of San Francisco on the eve of announcing IntraChange, an enterprise Web management system. With IntraChange, Webmasters can share management tools, delegating site administration by assigning various tasks to different sites and users.

CA and Cheyenne partner

■ Computer Associates International, Inc. (CA) and Cheyenne Software, Inc. have teamed up to improve storage management in CA's forthcoming system management software, company officials announced last week at PC Expo. CA will incorporate Cheyenne's Intelligent Application Agent technology — software that allows users to back up applications while they are in use — into its Unicenter/The Next Generation systems management product. Cheyenne will also develop a version of its ARCserve network backup software for Unicenter/TNG, which will enable CA's product to back up desktops and NetWare servers in addition to larger systems, officials said.

Beyond Web window shopping

■ VeriFone, Inc. last week unveiled software that will enable merchants on the World-Wide Web to track orders and transmit credit card numbers in encrypted form directly to a bank's Web site for customer card authorization. VeriFone's vPOS for Web-based merchants and vGATE for financial institutions together will let merchants get credit approvals right over the Internet instead of having to input the card number the customer sends to the merchant's Web server with an order into a point-of-sale device.

Building a better FEP

■ IBM this week is expected to fill in some gaps in its SNA and TCP/IP migration plans. The company is expected to add High Performance Routing (HPR) and TCP/IP routing capabilities to its 3746 Nways Multinetwork Controller Model 950, its next-generation front-end processor (FEP). HPR will let the box route SNA/Advanced Peer-to-Peer Networking traffic more efficiently, and TCP/IP routing will let it route multiprotocol traffic for the first time. Both features are expected late this year.

IBM, Microsoft show off clustering

Companies use PC Expo for demonstrations that focused on PC server failovers.

By Christine Burns

New York

IBM and Microsoft Corp. last week showed that PC server clustering is almost for real.

The companies separately used the PC Expo conference here as an opportunity to demonstrate prototypes of their server clustering software, which will be included in future versions of IBM's OS/2 Warp Server and Microsoft's Windows NT Server.

This new server-based software is designed to ensure that

on the other clustered server.

Microsoft's demonstration comprised two four-way symmetrical multiprocessing Intel Corp. Pentium Pro servers running Windows NT Server 3.51, including its clustering software, code-named Wolfpack.

A sales-related application let a client access both a SQL server database and a Web site via Microsoft's Internet Information Server running on the servers. The clustered system was managed via a graphical tool that showed the

application to the second server.

"I came to this show specifically to see this clustering demo," said Robert Pepe, plant engineer for Tevco, Inc., a manufacturer in South Plainfield, N.J. "Last week, one of our servers was literally smoking. In the end, we managed to contain things so that we didn't lose any money in lost production time. But things would have been a lot easier if we had a failover cluster set up."

Microsoft has said this level of clustering will be available for Windows NT Server in the first quarter of next year.

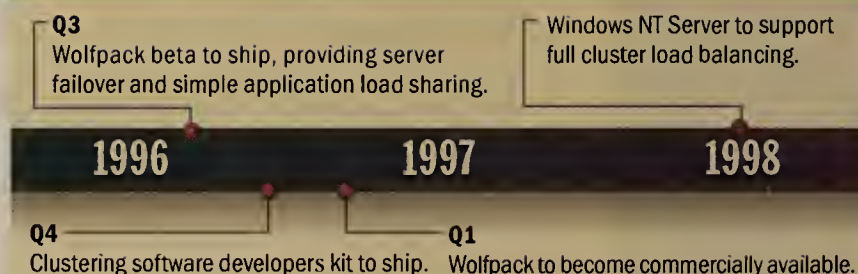
The second advantage of having clustering support within a network operating system is to let processor-hungry applications run across multiple nodes.

Microsoft's Wolfpack showed it could handle this task if the application running on the serv-

See Cluster, page 16



Microsoft's Windows NT clustering delivery plan



server processing power is available, enabling important applications to run without incident.

Both companies showed server software that provides an automatic failover process for moving applications and data from a downed server to one that is running.

IBM's clustering technology was demonstrated on two of the company's IBM PC Server 520 machines running OS/2 Warp Server 4.0. It was managed and monitored using extensions to Tivoli Corp.'s TME-10 Netfinity systems management software. Clients accessed the sales database applications running on the clustered servers via a standard Web browser, while a shared SCSI disk array was accessible to both servers.

When a server failure was detected through the heartbeat mechanisms pulsing between the machines via a token-ring network, or initiated manually by turning one of the nodes off, the remaining server automatically restarted the application

status of both the application and the servers.

Much like the IBM software, when one server was manually shut down, Wolfpack moved the

A B E N D

abend (n) 1: abnormal end to a computer process 2: the online fountain of 'Net wit and high-tech humor found on Network World Fusion (www.nwfusion.com).

A bouncing baby Web site

There was a time not long ago when hyperlinks were cool. Just click on the highlighted word or phrase and off you go to another Web site.

Now, of course, hyperlinks are routine, even boring. Worse, they are sterile and impersonal, mere colored words on a monitor luring the unsuspecting cybernaut into a Pavlovian cycle of pointing and clicking.

Fortunately for those Internet addicts who are losing touch with humanity, there's "Internet in a Baby." This inviting Web site presents the viewer with a photo of a baby (actually, he's more of a toddler) that contains hidden links. Just click on various parts of the baby's body to go to a humorous, weird or educational Web site appropriate for that portion of the picture.

Internet in a Baby, as well as other strange pages, can be found on Network World Fusion.

Visit Network World Fusion.
Select NetRef then Abend.



HOW TO REACH US

CALL: (508) 875-6400; **FAX:** (508) 820-3467; **INTERNET:** nwnews@nww.com; **WRITE:** Network World, 161 Worcester Rd., Framingham, MA 01701; **NETWORK HELP DESK:** Having trouble resolving a technical problem, locating resources or getting a vendor to follow up on a promise? Contact the Network Help Desk at (800) 622-1108, Ext. 451, or cnerney@nww.com; **SUBSCRIPTIONS:** nwcirc@nww.com; **REPRINTS:** In quantities of 500-10,000. Call (612) 582-3800. **MARKET LINE:** For details about future editorial projects, call (508) 820-7557.

THANKS.

Let's be honest. Having our NetServers showered with accolades is a kick.

Besides, it shows how serious we are about building quality network systems.

For detailed specs, visit <http://www.hp.com/go/netserver>. Or call 1-800-533-1333, Ext. 1688.

HP NETSERVERS

LAN
1996
PRODUCTS
OF THE
YEAR

PC
MAGAZINE
EDITORS'
CHOICE
March 26, 1996
HP NetServer 5/133 LH

PCComputing
★
BEST

Computer
ResellerNews
CHANNEL
CHAMPION
1 9 9 5

EDITOR REFUSES
TO GIVE IT
BACK
NETWORK
COMPUTING

intel
inside
pentium
PROCESSOR

MVP
WINNER
PCComputing

Pictured: the HP NetServer 5/100 LH. Awards shown: PC Magazine Editors' Choice HP NetServer 5/133 LH; PC Computing BEST HP NetServer 5/133 LS2; LAN Magazine Products of the Year HP NetServer LS Series; Network Computing Editor Refuses to Give it Back Award HP NetServer 5/100 LS4; PC Computing MVP HP NetServer 5/100 LH; Computer Reseller News Channel Champion Award NetServer Series. The Intel Inside logo and Pentium are registered trademarks of Intel Corp. ©1996 Hewlett-Packard Company PPG433

hp HEWLETT®
PACKARD

Different points of view on the future of ATM

NW Fusion panel split on what will rule background.

By Chris Nerney

If the Network World Fusion panel currently discussing the future of ATM was a jury, the judge would declare it hopelessly deadlocked.

Our trio of industry experts are sharply divided over whether emerging technologies such as gigabit Ethernet and IP switching will force Asynchronous Transfer Mode from the LAN backbone.

The way Bobby Johnson sees it, "Fast Ethernet has already won the desktop race. With the desktops going Fast Ethernet, isn't gigabit Ethernet the logical backbone?"

Johnson, former president and chief executive officer of Centillion Networks, Inc. and an 18-year network industry veteran, calls gigabit Ethernet "an extension and enhancement of current LAN infrastructures."

"Although ATM has great value and properties, it is far more invasive," said Johnson, who is forming a gigabit Ethernet start-up company. "ATM requires the learning and deployment of many new concepts, some of which may not be common among multiple vendors."

whatever ails your network," he said.

Unfortunately, Skorupa said, it is a cure that comes at a high cost. Besides requiring a major



Read what else our panelists are saying and voice your own opinions in our online conference. Select Forum then click the "Taking Aim at ATM" icon. (<http://www.nwfusion.com>)

forklift upgrade, installing gigabit Ethernet in your network would mean "a massive cable plant upgrade."

"In the end, the expense and disruption of an upgrade to gigabit Ethernet will be significant," Skorupa said.

He added that neither gigabit Ethernet nor IP switching "provides a multiservice backbone with guaranteed quality of service. Consequently, neither is a replacement for ATM in the backbone."

George Dobrowski, chairman of the ATM Forum's Worldwide Technical Committee, believes there is a place at the backbone table for several technologies.

"Alternative solutions competing for the same market will divide the backbone market somewhat," he said. "The user will have to consider the price/performance points and decide whether the scalable multiservice ATM solution or the gigabit Ethernet solution best meets their current needs and their anticipated needs a few years out."

This choice is critical, Dobrowski said, because "the backbone decision must be able to stand up to six to 10 years of evolving needs."

According to Dobrowski, the need for a long-term commitment to a network backbone plays to ATM's strengths.

"ATM provides a multiservice environment on a common infrastructure which is flexible, providing high performance and quality of service," he said. "It's important to think of ATM not only as it is today, but also how it will look and what it can support in the years ahead." ■

Digital ports IP code technology across LAN switching gear

New Ipsilon code allows customers to deploy more scalable ATM nets.

By Jodi Cohen

Maynard, Mass.

As expected, Digital Equipment Corp. this week will incorporate IP code from Ipsilon Networks, Inc. into its switching gear to enable users to build networks combining the intelligence of IP routing with the power of Asynchronous Transfer Mode (NW, April 1, page 1).

Digital will port Ipsilon's IP switching software — which can decide when to switch and when to route based on the needs of IP traffic — to its Gigaswitch/ATM switch, DEChub 900 switching hub and ATMworks adapter cards, according to sources familiar with Digital's plans. Digital declined to comment.

The code will give customers who are frustrated with the slow pace of Multi-Protocol over ATM (MPOA) standards a more efficient, scalable way to deploy ATM, analysts said.

"IP switching is aimed at corporate users who have high-end intranet requirements, service providers that provide Internet content support, and users who

have large ATM implementations and major investments in IP," said John Morency, principal at The Registry, Inc., a consultancy based in Newton, Mass.

WHAT'S IP SWITCHING?

- Combines IP routing software with ATM switching hardware.
- Dynamically determines when to switch and when to route based on the needs of IP conversations.
- Proprietary alternative to the ATM Forum's MPOA standard, expected in 1998.

"Customers who do not want to wait for MPOA can get performance enhancements with IP switching technology right away."

But Charlie Robbins, vice president of communications research at Aberdeen Group, Inc., a consultancy in Boston, said customers should be aware of IP switching's shortcomings. "How will you migrate this technology once some of the [quality of service] stuff and MPOA standards become readily available?" he asked. "Also, this is IP-centric, so if you have a Novell

LAN, you're out of luck."

However, Michael Howard, president of Infonetics Research, Inc. in San Jose, Calif., said that customers who need IP switching technology today should not be scared off because it is not standard.

"Many technologies were first proprietary and then became standardized," he said. "I certainly think that IP switching has the potential to be an industry standard."

Digital will also expand its ATM product line with a five-slot version of its Gigaswitch/ATM device, which gives the company its first mid-range ATM switch. Previously, the Gigaswitch/ATM switch only came in a 14-slot version, precluding Digital from competing with mid-tier products from Bay Networks, Inc., Cisco Systems, Inc. and Fore Systems, Inc.

Customers will be able to take advantage of the new IP switching code via free software upgrades, which will be available in September.

© Digital: (508) 493-5111.

CrossComm makes Ethernet backbone switch pitch

By Jim Duffy

Marlborough, Mass.

CrossComm Corp. last week unveiled an Ethernet backbone switch that boasts advanced management and network reliability but still is less expensive than competing devices.

The RiserSwitch, powered by a nonblocking 640M bit/sec backplane, comes in three models that sport 14 10Base-T ports and as many as eight 100Base-TX ports. The switch includes a dedicated i960 RISC processor for collecting full Remote Monitoring (RMON) statistics and switching Application Specific Integrated Circuits (ASIC) at each port, which help keep network segments available.

"A lot of other vendors have multiple ports per [switching] ASIC," said Larry Howard, an analyst at Infonetics Research, Inc. in San Jose, Calif. "If that ASIC goes out... you may be out quite a few ports."

And at \$725 to \$835 per port, CrossComm's RiserSwitch costs about 20% less than products from Bay Networks, Inc., Cisco

Systems, Inc. and 3Com Corp., CrossComm officials said.

RiserSwitch is targeted at small to midsize sites where network management is a requirement and fault tolerance is desired. The switch can be used to segment or replace shared network LANs. Users can attach hubs, concentrators and workgroup switches to the RiserSwitch, providing full-duplex links to centralized server farms and other resources.

A RiserSwitch resulted in "noticeable improvements" in network performance at Inmar, Inc. in Winston-Salem, N.C., said Dwight Springthorpe, a corporate communications engineer at the firm. The company is using the switch to link more than 300 end users on three floors who use the net for SQL queries, file transfers and more.

One reason for the improved performance may be that the switch is designed to reduce packet-switching latency. Rather than sending all packets through an address processor, all ports receive a packet and wait for the

address processor to determine which port should forward it. The remaining ports then drop the packet from buffer memory.

But management may be the RiserSwitch's key differentiator. The switching ASICs at each port collect the first level of RMON

CROSSCOMM'S RISERSWITCH

- Support for 8,000 to 32,000 MAC addresses
- Switching ASICs and 256K-to-1M-byte buffers on each port
- Support for up to 32 virtual LANs
- Available now



statistics, which are packet and error counts. The central RISC processor collects statistics from eight other RMON groups. The RISC processor eliminates the need to buy a dedicated RMON probe.

© CrossComm: (508) 481-4060.

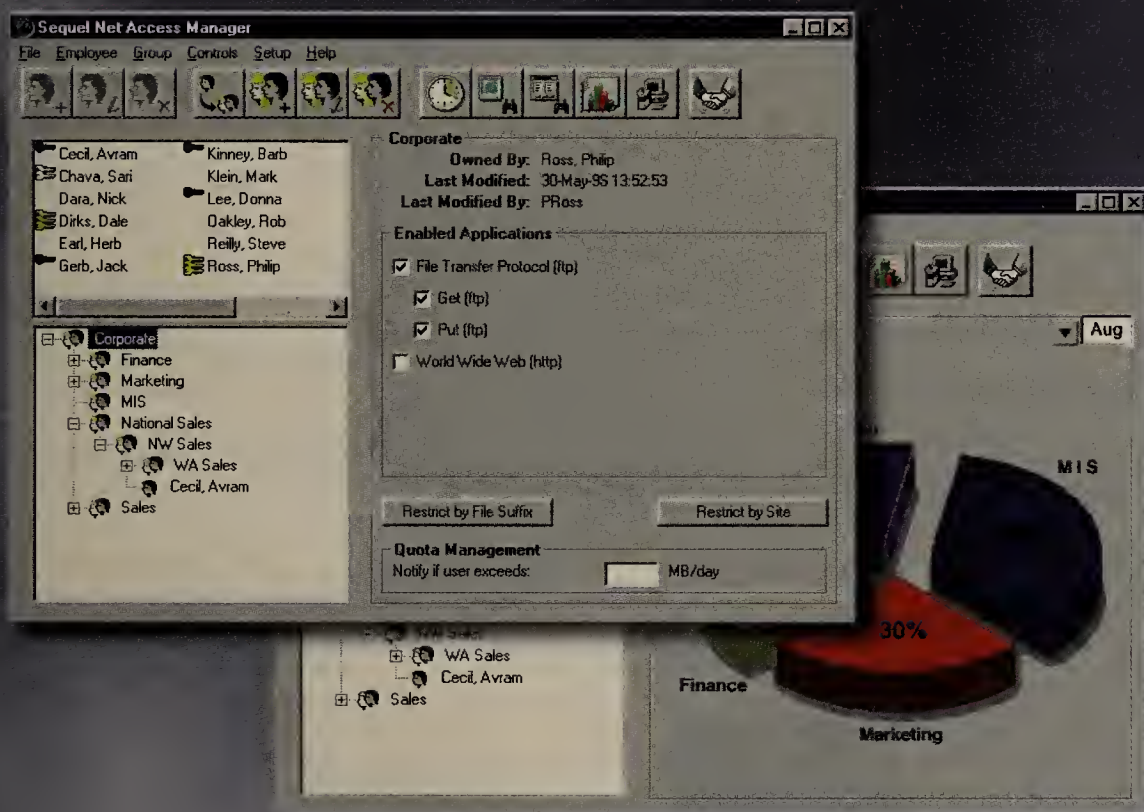


Johnson predicted that "Fast Ethernet switches with gigabit uplinks into all gigabit switches will provide better price/performance characteristics than ATM shortly."

But Joe Skorupa, director of marketing for switches and inter-networking at Fore Systems, Inc., said gigabit Ethernet is long on promise and short on payoff.

"As with every new technology announcement, gigabit Ethernet is the latest cure for

The Net has enormous potential to let people gather facts, share information, explore new ideas, squander resources, bloat local storage and bring your network to its knees with interminable traffic composed of who-knows-what.



Introducing Sequel Net Access Manager.

While the online revolution may well be the best thing to happen in a long time to people who use information, it could be the worst thing that ever happened to your network – if you don't know what's going on. But now there's Sequel Net Access Manager, the

Although the core of Sequel Net Access Manager is a powerful IP packet filter, the main user interface is intuitive enough for non-IS managers to establish access privileges and run reports.

most effective tool for managing and reporting your company's Internet, intranet and online usage. It's easy to install, easy to use, and makes it a snap to monitor and report data traffic and service requests by user, by group or across your company. It even lets you set access and download privileges, if you choose. All without degrading performance anywhere on your system. Call **800-881-2465 ext. 4040** or visit us at www.sequeltech.com to learn about our free product evaluation program.

Or contact your local software reseller today.

SEQUEL™

© 1996 Sequel Technology Corporation. Sequel Technology and Sequel Net Access Manager are trademarks of Sequel Technology Corporation.

Sequel **NET** **ACCESS MANAGER**™

1996 NetWorld + Interop Best of Show Finalist

Microsoft and Cisco square off on 'Net-based remote access

By Tim Greene
Montreal

A battle between Microsoft Corp. and Cisco Systems, Inc. will heat up this week over rival protocols for letting remote users burrow through the Internet to establish secure links to corporate LANs.

The Internet Engineering Task Force (IETF) today is scheduled to review the Point-to-Point Tunneling Protocol (PPTP) backed by Microsoft and Layer 2 Forwarding (L2F) backed by Cisco. Meanwhile, equipment vendors will be holding their breath over the outcome, hoping the protocol they support becomes the industry standard.

"IETF approval is vitally important," said Laura Howard, director of product management at Shiva Corp., which supports L2F. But she said the key is that a single standard emerges so virtual private networks (VPN) can be built without regard to vendor equipment.

Cisco and Microsoft will likely get together to establish a compromise so that the two approaches interoperate, said Jeff Price, a product manager for Microsoft's Windows NT Server.

But some vendors are charging ahead without an IETF ruling. For example, Ascend Communications, Inc. has built

PPTP code as well as its own tunneling code, Ascend Tunnel Management Protocol, into its Pipeline and MAX access products, said Steve Thomas, Ascend's director of product marketing.

And Northern Telecom, Inc. plans to announce this week that it will support L2F in its Rapport Dialup Switch in the fourth quar-

Light at the end of the tunnel?

Vendors are lining up behind either Cisco or Microsoft, which are backing separate standards for tunneling secure links through the Internet.

Point-to-Point Tunneling Protocol

Microsoft, Ascend, ECI Telecom, 3Com and U.S. Robotics

Layer 2 Forwarding

Cisco, Nortel and Shiva

ter. But the company is concerned about IETF approval. "It makes a lot of difference to us," said Peter Brockmann, senior manager of Internet solutions at Nortel.

Nortel found L2F to have more features than PPTP, and also found it to be more open. "With PPTP, the [corporate

See Tunneling, page 84

Lotus details future 'Net plans

By Barb Cole
New York

Lotus Development Corp. last week outlined plans for a next generation of modular Notes-based Web servers built on Internet-only standards.

The Web servers, collectively code-named Domino II, will exploit 'Net protocols such as Simple Mail Transfer Protocol and Lightweight Directory Access Protocol, as well as the HTML data format.

Lotus talked up its 'Net plans at the PC Expo show here last week. "There are a variety of ways we've already opened up Notes, but we are taking it a step further [with Domino II]," said Tim Dempsey, director of Notes product marketing at Lotus.

Specifically, the company is evolving core Notes services into modules that may be accessed via Internet protocols.

The first line of Domino II products, expected to enter beta

tests by the end of the year, will include the Notes-based object store and manage HTML pages, Multi-purpose Internet Mail Extensions messages, images, Java and LotusScript applets, and other objects. The company will provide a Common Object Request Broker Architecture-compliant programming interface to the server, Dempsey said.

The move will allow developers easy programmatic access to Notes services and allow them to exploit selected pieces — such as replication, security or directory services — of Domino II technology.

The company has already begun incorporating Web server technology into Notes. Its Domino I HTTP Services for Notes is expected to ship in July and will also be included in Release 4.5 of Notes, due in the third quarter of this year.

See Lotus, page 84



HP, Tivoli join on application mgmt.

Application Response Measurement API monitors end-to-end network transactions.

By Jim Duffy
Cupertino, Calif.

Hewlett-Packard Co. and IBM's Tivoli Systems, Inc. subsidiary last week announced they have jointly developed a vendor-neutral approach to monitoring the performance of distributed applications.

Their Application Response Measurement (ARM) API is designed to help customers measure end-to-end application response time, a key capability for companies deploying client/server applications.

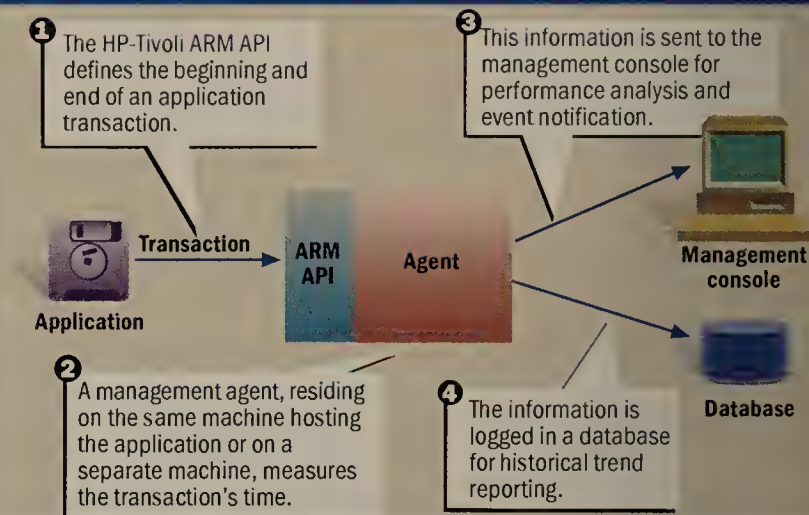
The companies will make the ARM API freely available on the World-Wide Web. The ARM API has already won the support of 10 companies, including Boole and Baggage, Inc., Candle Corp., NCR Corp., Netscape Communications Corp., Sun Microsystems, Inc., Sybase, Inc., Texas Instruments, Inc., and Unify Corp.

"Their main goal is to get the industry to buy off on this set of interfaces," said Tim Wilson, senior consultant at Decisys, Inc.

in Sterling, Va. "They have a good chance. I'm not aware of any other specs that do specifically what these do."

response-time metrics up to a management console where network managers can ensure that service levels are maintained.

Application Response Measurement (ARM) in action



The ARM API can be added to off-the-shelf applications and to internally written software during development to define a transaction. That transaction can then be monitored by management agent software, which will pass performance and

Using the API, network managers can gather statistics on application availability, response time, throughput and usage. The API supports any communications method used by the console and agent, such as Simple Network Management Protocol and remote procedure calls, the companies said.

HP and IBM will add the API to their respective Measureware and Tivoli Management Environment 10 products within 60 days.

HP's Measureware is agent technology specifically for network, application, systems and database response-time analysis (NW, July 17, 1995, page 30).

The HP division that develops Measureware — the Resource and Performance Management group — is separate from HP's Network and Systems Management Division (NSMD), which develops the OpenView network and systems management platform, and competes aggressively in this space with IBM. NSMD is "comfortable" with the HP-IBM collaboration, though, according to an HP spokesman who noted that Measureware agents collecting ARM statistics can present this data on an OpenView console.

In addition to the API, HP and IBM are releasing an ARM kit that lets software developers define transactions within their applications. The developers kit is available at no charge from the HP and Tivoli Web sites at <http://www.hp.com/go/arm> and <http://www.tivoli.com>.

Other companies backing the ARM specification include SAS Institute, Inc. and Nat Systems, Inc. ■

LAN management

Novell plots ManageWise course

By Ben Heskett

Novell, Inc. last week unveiled a two-year plan for ManageWise that starts with Windows NT and ends with a full-tilt move toward Java.

The first step in the ManageWise metamorphosis is support for Windows NT servers (NW, June 10, page 1), which ship in August with the 2.1 release of ManageWise. NT management is accomplished via a Simple Network Management Protocol agent that rests on an NT server and sends information to an administrative console.

Version 2.1 will also support NT clients by the end of the year, letting administrators perform desktop management functions on NT workstations.

By 1997, the increasingly ubiquitous Java programming language, which is both platform- and protocol-independent, will be used to make applets that collect network data about computers and other devices. That information is then translated to HTTP and made available to an administra-

tor via a Web browser.

The Java-based management tools will essentially take the place of current NetWare Loadable Modules used for management, according to Shelley Dougery, Novell's director of marketing for management products.

ManageWise 2.1, which will ship in August, comes to the marketplace as Novell tries to reposition itself as a cross-platform software company through its plans to port Novell Directory Services (NDS) to NT (NW, June 10, page 1).

Software distribution is now available for ManageWise via an Application Launcher, which can create user applications in NDS as objects and make them available to the user from wherever they log on. A licensing tool is also in the works from Novell, according to Dougery.

ManageWise 2.1 costs \$595 per server; user license packs start at \$795 for five desktops and a server. Current users can upgrade for \$400 per server.

© Novell: (800) 638-9273.



Novell's Dougery

Band-
width
is tight.
ATM
sounds
nice.
But it
also
sounds
pretty
darn
expen-
sive.

Switch

IBM presents the first affordable 25Mbps ATM Workgroup Solution. Everyone is talking about ATM as the answer for speeding up busy networks. But there are two good reasons why business hasn't stampeded en masse to the ATM solution: It costs a lot. And to get there, you have to rip out everything you have.

Well, with all respect to the status quo, IBM now unveils the new 25Mbps ATM Workgroup Solution. It comes complete with workstation adapters, giving you an immediate boost in bandwidth, with plenty of room to grow in the future. And it all comes at the refreshingly low price of \$495 per connection.

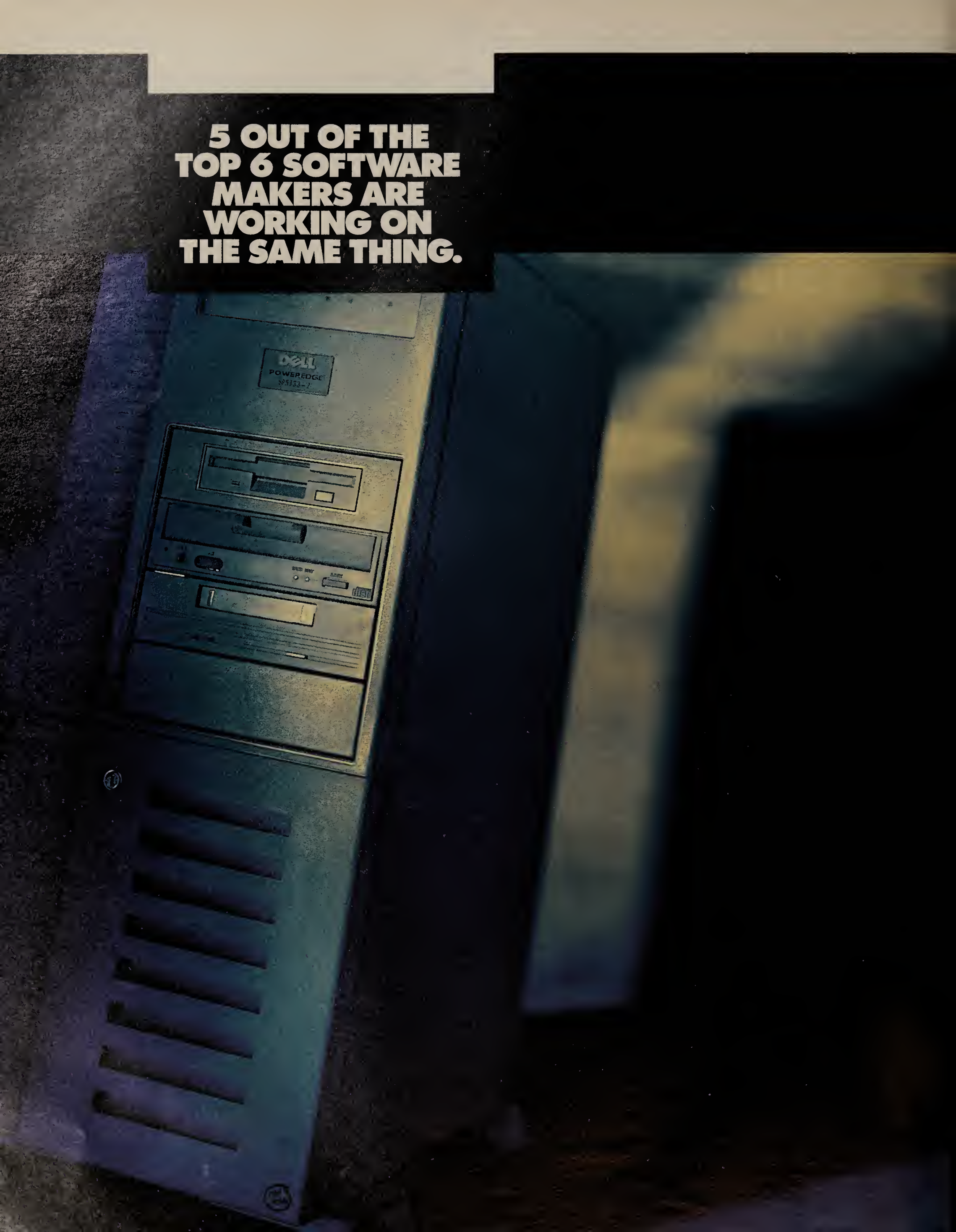


So why just dream about getting an affordable ATM solution when you can install one today? See your nearest IBM reseller or call us at 1 800 IBM-2468, ext. DA130, to learn more. Or, if you prefer, you can visit our Web site at www.raleigh.ibm.com/netad.html for all of the details. We have lots of information to share. And the good news is, we can get it to you fast.



Solutions for a small planet™

**5 OUT OF THE
TOP 6 SOFTWARE
MAKERS ARE
WORKING ON
THE SAME THING.**

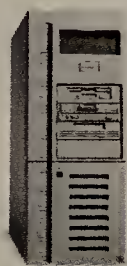


The secret is out in the software industry. Dell servers are used by the industry's heaviest hitters. And if Dell isn't the first word you think of when you think of servers, you're about to find out why it represents the last word in reliability and value.

You see, to handle the server needs of the biggest software makers, we haven't just developed a healthy respect for mission-criticality, we've also developed a hefty network of dedicated high-end server support. Support that begins with sending along a Systems Engineer with the delivery of every PowerEdge XL server, to make sure it'll be up and running. And support that continues with available Dell CriticalCare, 4-hour response, 7 x 24 on-site service.

Of course, what makes all this support even more reassuring is the fact that our ISO 9002 dedicated server factory builds Dell servers to be extremely reliable in the first place. And we're focused on building servers that meet industry standards, instead of the proprietary architecture that IBM, HP and Compaq use.

So if you're driven, risk-averse and obsessive about your data, congratulations, you have a lot in common with the software industry's biggest success stories. And if you call Dell, you'll have even more.



DELL® POWEREDGE™ XL 5133-4

133MHz PENTIUM® PROCESSOR
(Expandable to Quad Processor)

- 256MB ECC Memory
- Three 4GB Fast/Wide SCSI-2 HDD
- 15TX Monitor (13.7" v.i.s., .26NI)
- Mylex RAID Controller
- 3Com® PCI NIC
- 6X SCSI CD-ROM
- SafeSite™ Server Management Software
- On-site* setup and Validation
- 3 Year BusinessCare™ Warranty†
- 1 Year DirectLine™ NOS Support

\$20,835

Product Code #200127

DELL POWEREDGE XL 5133-4

133MHz PENTIUM PROCESSOR
(Expandable to Quad Processor)

- 128MB ECC Memory
- Three 4GB Fast/Wide SCSI-2 HDD
- 15TX Monitor (13.7" v.i.s., .26NI)
- Mylex RAID Controller
- 3Com PCI NIC
- 6X SCSI CD-ROM
- SafeSite Server Management Software
- On-site Setup and Validation
- 3 Year BusinessCare Warranty
- 1 Year DirectLine NOS Support

\$15,935

Product Code: #200124

DELL POWEREDGE SP 5166-2

166MHz PENTIUM PROCESSOR
(Expandable to Dual Processor)

- 64MB ECC Memory
- Three 2GB SCSI HDD
- 512KB Cache
- DSA RAID Controller
- 3Com 10/100 Ethernet Adapter
- 6X CD-ROM
- 15LS Monitor (13.7" v.i.s., .28NI)
- SafeSite Server Management Software
- 3 Year BusinessCare Warranty

\$9,607

Product Code #200128

DELL POWEREDGE XE 5166-2

166MHz PENTIUM PROCESSOR
(Expandable to Dual Processor)

- 64MB ECC Memory
- Three 4GB SCSI HDD
- 512KB Cache
- DSA RAID Controller
- 3Com 10/100 Ethernet Adapter
- 6X CD-ROM
- 15LS Monitor (13.7" v.i.s., .28NI)
- SafeSite Server Management Software
- 3 Year BusinessCare Warranty

SYSTEM NOT PICTURED

\$13,787

Product Code: #200129



DELL®
800-627-9966
<http://www.dell.com>

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT • Sun 12pm-5pm
In Canada*, call 800-839-0148

Keycode #29017

†For a complete copy of our limited warranties, please write Dell USA L.P., 2214 W. Braker Lane, Suite D, Austin, TX 78758. *This on-site parts and labor service provided by Digital Equipment Corporation and is available in 29 metropolitan areas. For more information call Dell's TechFaxSM line at 1-800-950-1329. Prices and specifications valid in the U.S. only and subject to change without notice. Microsoft, Windows and the Windows NT logo are registered trademarks of Microsoft Corporation. The Intel Inside logo and Pentium are registered trademarks of Intel Corporation. 3Com and the 3Com Network Ready logo are registered trademarks of 3Com Corporation. BusinessCare and DirectLine are service marks of Dell Computer Corporation. ©1996 Dell Computer Corporation. All rights reserved.

Bay picks up Penril modem group

\$120 million deal should allow company to build remote access gear for less.

By Jim Duffy
and Tim Greene

Continuing its assault on the Internet access market, Bay Networks, Inc. last week said it is buying Penril Datacomm Networks, Inc.'s modem business for about \$120 million.

Penril's Digital Signal Processing (DSP) technology will give Bay an internal source of modem technology that it can plug in to its remote access servers and concentrators.

Bay currently has an OEM arrangement with Microcom, Inc. for modems that it has integrated into its new Remote Annex 6300 and 5000 MSX remote access gear. But the Penril deal will enable Bay to cut the cost of providing integrated modem hardware in half by eliminating OEM royalties and

other fees.

For Penril, the deal means an infusion of funds that will help the company deliver its Access Beyond product line, some of which is behind schedule.

BAY WATCH

Bay fires up Internet access product line. **Page 19.**

Melinda Le Baron & Skip MacAskill opine on Bay's acquisition. **Page 30.**

Access Beyond is Penril's family of modular remote access products that can function as bridge/routers, terminal servers, statistical multiplexers or multi-protocol access nodes.

Penril made two stock offerings this year to raise capital, but it didn't raise enough to deal with both Access Beyond and the DSP modem business. "There were not enough resources to realize both strategies with competing objectives. We realized both could be profitable and successful on their own," said Ron Howard, Penril's president.

Under the Bay deal, mean-

while, the company plans to take over licensing of DSP technology to other companies.

Penril currently sells modem technology to a number of PC and chip manufacturers, said Bruce Sachs, Bay executive vice president and head of the company's Internet/Telecom business unit.

Bay itself plans to continue licensing technology from Microcom, Sachs said. "We intend to offer the Microcom technology as an alternative to our customers who wish to buy it," he said.

But it might be hard for customers to pass up Penril's DSP technology, which lets users upgrade their modems to support new standards or features via a software download rather than a hardware change.

Penril's roughly 40-person modem workforce will join Bay. The companies expect the transaction, in which Bay will exchange \$10 per Penril share payable in Bay stock, to be completed in September. ■

Shiva acquisition to speed up remote access

By Tim Greene
Bedford, Mass.

Shiva Corp. last week announced plans to buy AirSoft, Inc. for \$62 million, a deal that gives Shiva the potential to make remote network access cheaper for its customers.

The acquisition gives Shiva the rights to one of the market's best wide-area caching products — Powerburst — just as AirSoft is developing enhancements that will make it applicable to Internet access.

Powerburst reduces the amount of traffic on dial-up calls, which makes them shorter and less expensive. The technology can let a client machine cache parts of a centrally located application so that the client needs to access over the dialup link only those parts of the application relevant to a new request or those that have been updated since the last caching.

Using Powerburst can improve response time by 200%

to 400%, which translates to a 67% to 85% cut in phone bills generated by accessing applications supported by Powerburst. These applications include electronic messaging, scheduling applications and server supported databases.

AirSoft profile

Headquarters: Cupertino, Calif.

Founded: 1993

Primary business: Development of caching software for WANs

Revenue (past 12 months): Less than \$1.5 million

"Anything that reduces user response time over a skinny link sounds like a good thing," said Rolf McClellan, senior consultant at Strategic Networks Consulting, Inc. in Rockland, Mass.

AirSoft is working on client and server agents that would support caching for Internet protocols including the World-Wide Web's HTML technology. The companies would not say when that would be ready, what performance gains it might provide or how it might be packaged.

But it is clear that since AirSoft's agents need to run both on a client and server, they will need to work with the Shiva Client and Shiva PPP software offerings. "We're not sure whether we'll roll it into Shiva PPP or whether it will be an add-on," said Frank Ingari, Shiva's chief executive officer.

The AirSoft acquisition effectively cuts off Shiva competitors, including Cisco Systems, Inc., that currently license AirSoft software. Shiva will continue to license AirSoft technology, but the company will charge so much more for the licenses that competitors will likely decline, Ingari said.

The deal should enable Shiva to boost remote access switch and server sales, said Mike Hajjar, vice president of marketing and sales for Measurement Technologies, Inc., an AirSoft competitor. "[AirSoft's] value is they make the remote link faster than anybody else's," he acknowledged.

Caching enhances Shiva tariff management, which drops idle dial-up connections while giving the feel the link is still up. ■

IBM releases standards-based firewall product

By Carol Sliwa
New York

IBM launched a series of enhanced products last week at PC Expo, including a new standards-based version of its firewall product, the Internet Connection Secured Network Gateway.

Version 2.2, IBM's third release, will support the Internet Engineering Task Force's IPsec standard, meaning users will be able to exchange data securely with anyone using a firewall that supports IPsec.

Other new features include Network Address Translation, permitting network administrators to hide their users' IP addresses from the outside world, and default filter rules, allowing network managers to decide what traffic is allowed in and out of the network.

The product is due for general release in the third quarter at a cost of \$9,999 for unlimited users, but IBM is offering a free 60-day beta test of the product to anyone with a Web browser.

The firewall runs only on AIX, but IBM has plans to support NT and MVS, according to Vijay Ahuja, IBM's network security products manager. ■

LDDS WorldCom simplifies dial-up frame relay

By David Rohde
Tulsa, Okla.

Later is greater if you build a better mousetrap, according to LDDS WorldCom.

The No. 4 interexchange carrier last week became the third of the four major IXC's to introduce analog dial-up access to frame relay networks.

But while hardly first off the block, the LDDS offering is potentially more economical than competitors' because it is based on a scheme in which dial-up users pay for only the usage they generate instead of also being slapped with port charges and other fees.

LDDS officials claim that the simplified pricing makes it uniquely equipped not only to extend traditional frame relay nets, but also to create new nets built almost exclusively around dial-up access.

Thus, insurance companies could give dial-up frame relay access for occasional use to insurance agents without fear of rolling up bills for underused ports and permanent virtual circuits (PVC), said Jennifer Bai, an LDDS WorldCom frame relay product manager.

Under LDDS' offering, network managers purchase a single

PVC between the host site and the carrier's dial-up gateway at normal frame relay rates. Then individual remote users dial up — either through a local phone number or a nationwide toll-free code that brings them to the

Pay as you go

LDDS WorldCom's charges for dial-up access to frame relay are usage-based:

- **Dial-up option to local phone number:**
7 cents per minute,
or \$4.20 per hour
- **Dial-up option to 800 or 888 number:**
15 cents per minute,
or \$9.00 per hour
- **Both options:**
Onetime \$5 set-up fee
per individual

SOURCE: LDDS WORLD.COM, TULSA, OKLA.

gateway — and the company pays for the usage at per-minute rates (see graphic).

Under similar offerings from AT&T and MCI Communications Corp., the company must pay separately for a port and PVCs shared by the dial-up users, in some cases with usage charges added on top. Sprint Corp. allows dial-up access only through ISDN and switched 56K

bit/sec access, forcing an extra customer premises equipment requirement on the end user beyond a modem and communications software.

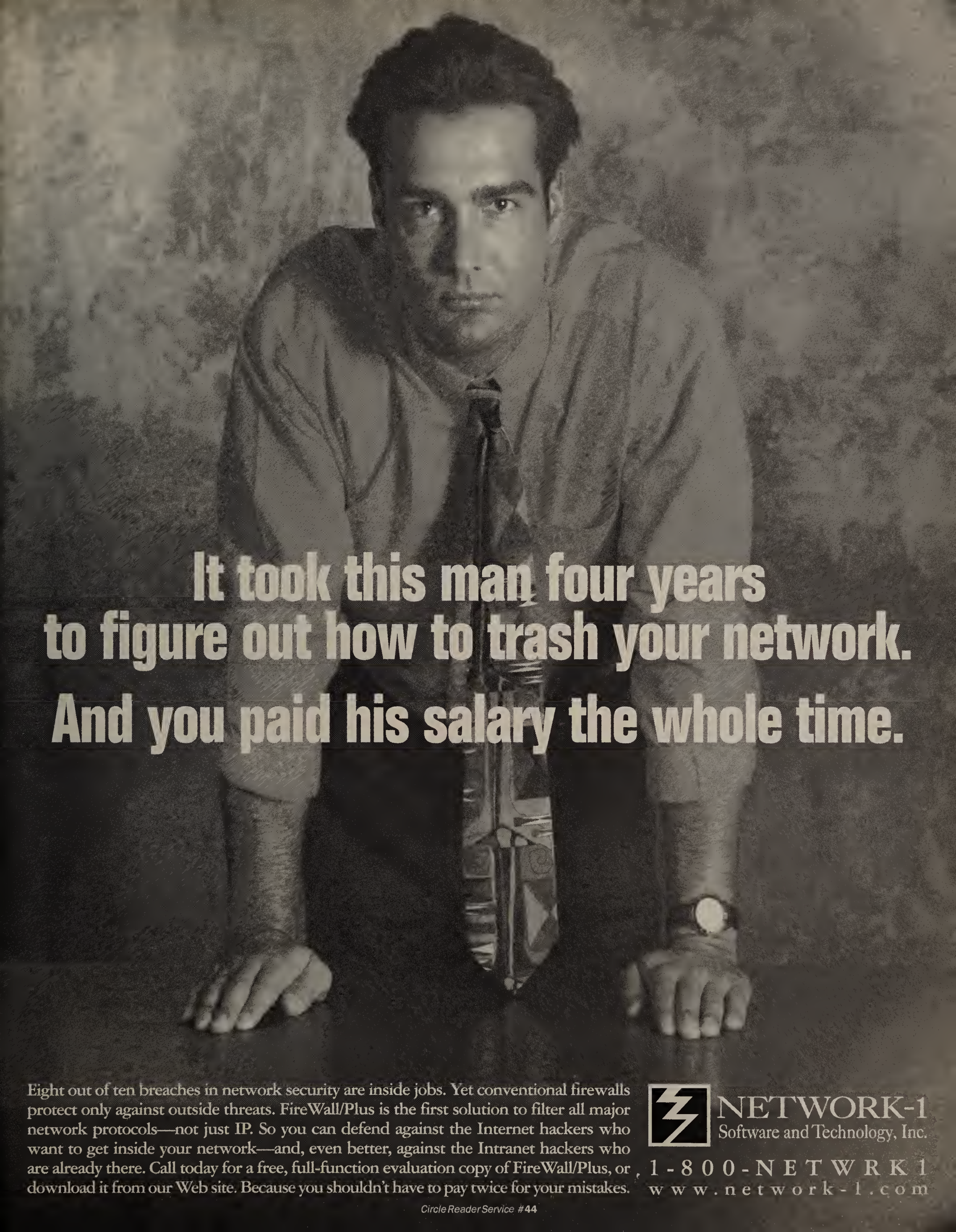
Sizing is important

To make the LDDS scheme work, the network manager must be careful to size the host-site PVC and the associated port on the frame relay switch to scale to the expected traffic, Bai said.

Networks with 25 or fewer remote users would be fine with a PVC assigned a 64K bit/sec committed information rate (CIR), she said. Networks with a much greater reach — to 800 potential users — should get a PVC with a 512K bit/sec CIR, Bai recommended.

"What really impressed me is their simple price structure," said Liza Henderson, a broadband analyst with TeleChoice, Inc., a consulting firm based in Verona, N.J.

The LDDS offering is also ideal for Internet service providers seeking to collect dial-up traffic from a large number of users with typical PC-modem setups, Henderson said. "The end user doesn't even need to know that it's frame relay they're dialing into," she said. ■



**It took this man four years
to figure out how to trash your network.
And you paid his salary the whole time.**

Eight out of ten breaches in network security are inside jobs. Yet conventional firewalls protect only against outside threats. FireWall/Plus is the first solution to filter all major network protocols—not just IP. So you can defend against the Internet hackers who want to get inside your network—and, even better, against the Intranet hackers who are already there. Call today for a free, full-function evaluation copy of FireWall/Plus, or download it from our Web site. Because you shouldn't have to pay twice for your mistakes.



NETWORK-1
Software and Technology, Inc.

1 - 8 0 0 - N E T W O R K 1
w w w . n e t w o r k - 1 . c o m

SAP

Continued from page 1

end application performance tuning technology.

R/3 consists of a client-based graphical user interface (GUI)

and a suite of server-based applications, as well as a database server.

It sounds simple enough, but R/3 takes time to learn, and time is money. It takes money to hire people familiar with R/3 and to

be interviewed for this story and would not confirm the cost figures associated with their R/3 implementations. But if their situations are anything like 3Com's, systems management vendors should be champing at the bit for a piece of that action.

"There's a lot of configuration, a lot of tuning [required], and it just sucks up a lot of time and energy to get the [R/3] applications really running the way the customer wants them to run," said John McConnell, president of McConnell Consulting, Inc. in Boulder, Colo.

The race is on

Platinum hears this. The company sees a need for application load balancing, database and server monitoring, and network service-level transaction management in the R/3 world, McAvoy said. Platinum is looking at customizing some of its performance management tools for R/3 environments, he said.

IBM and its Tivoli Systems, Inc. subsidiary, meanwhile, are shipping the Tivoli AMS Module for R/3, which was announced in January. It works with CCMS to provide event management, automated response and distribution of software on client workstations.

"One aspect of the SAP system can affect the entire setup," said Dennis Szerszen, market manager for applications management at IBM. "It's such an all-encompassing thing, you really have to be aware of all the processes that are happening within SAP in order for it to be success-

SAP feels your pain

SAP AG hasn't taken R/3 implementation issues lying down.

The company this month started shipping software that enables customers to sample implementation scenarios before they undertake their projects. SAP also launched a training program for R/3 implementations last month, and in July, the company will announce more initiatives designed to ease implementation of R/3.

Overall, it takes companies an average of six to 12 months to implement R/3, according to Eileen Basho, vice president of professional services at SAP America, Inc.

As far as cost, "you're everywhere on the continuum," she said. "When you hear about these projects that have these very high [cost] ratios, there's typically a very large component of business process reengineering associated with the project that really has little to nothing to do with the actual implementation of the software."

SAP figures implementation costs should equal or be no more than twice that of the R/3 software license itself, Basho said. Anything higher than that usually involves other costly components besides implementation, she said.

"There are major business change initiatives that are going on within those organizations" that are spending tens of millions of dollars on R/3, she said. "The other side of that number is their return on investment."

—Jim Duffy

Who will cash in on the R/3 problem?

Company	Strategy
Platinum	Customizing performance management tools
IBM/Tivoli	Shipping Tivoli AMS Module for R/3; trying to get R/3 code earlier; looking to double or triple R/3 programming staff
HP	Integrating SAP management tools with its own; offering consulting service to reduce time and expense of implementing R/3
CA	No product strategy yet

Cluster

Continued from page 6

ers had separate components. In this case, a network administrator using a tool being added to the NT Server administration tool set could define which components of an application run on each server in a cluster, said Mark Wood, a Microsoft product manager. Microsoft will make this two-node clustering server software available early next year.

To expand beyond two-node load balancing, customers will have to wait for Microsoft to publish a set of APIs that developers can use to write applications that can run across a clustered server configuration without the network manager having to get involved.

Art Olbert, director of product plan management in IBM's personal software products division, said IBM is also writing APIs that will enable application developers to create programs that will scale across multiple servers. However, he declined to outline IBM's partners or provide availability dates for the APIs.

IBM also last week revealed plans to use technology from its mainframe products to help customers cluster servers.

Examples include Parallel Sysplex, an OS/390 tool that allows for the flexible distribution of processes across processors.

The CICS transaction processing technology could also play a role in server clustering, IBM officials said.

"Clustering is easier to do if you have the technology [in another part of the company] than if you have to create it," said Michael Coleman, general manager of IBM's PC server division.

Staff writer Ben Heskett contributed to this story.

train people to use it. And R/3 is usually going into sites with legacy systems and applications, so integration work can exhaust much of a company's IT budget.

Citing a company policy not to disclose such information, Marina Levinson, 3Com's director of global integration, would not confirm whether it is costing the company \$10 million to implement R/3.

But she acknowledged that R/3 was more expensive and took longer to implement than 3Com had expected (see story below).

"At the beginning, it was more difficult than we envisioned because the particular package was very new. It was very difficult to find resources on the system integrator side that were adequately familiar with the functionality," Levinson said. "It's a fairly complex package to implement, but it's also very comprehensive."

Digital and Baxter declined

3Com takes its time with R/3

It took 3Com Corp. 15 months to get the first phase of its SAP AGR/3 implementation up and running, and it will probably take another 15 months to complete the second phase.

But it should get easier after that, with subsequent phases taking two or three months each.

The lengthy implementation cycle is due not only to the complexity of R/3, but to the many changes going on at 3Com as the company expands its operations, said Marina Levinson, director of global integration.

3Com is installing R/3 worldwide for all core transaction applications, including sales and distribution, financials and manufacturing.

3Com was generating annual revenue of \$600 million when Levinson first planned to implement R/3; it is now a \$2 billion company.

That's where customization expenses can add up because as a company grows, more desktops need to be connected, more legacy gear needs to be integrated and more types of products need to be tracked.

To date, 3Com is relying on consultancy Price Waterhouse as well as internal and third-party programmers to manage the R/3 integration project.



3Com's Levinson

—Jim Duffy

fully managed."

IBM estimates that the cost of installing the R/3 GUI on 12,000 workstations costs about \$600,000. "That's why [software] distribution management is an incredibly important piece of it," Szerszen said.

Also, IBM worked with one large customer that was spending \$40,000 a year just to manually check the CPU and memory utilization on about 20 R/3 servers — a task that should only take a few seconds using an automated approach, Szerszen said.

"This is such big business that people can make money off of the downtime aspect of it," he said.

That's why IBM's activity does not stop with the Tivoli AMS module; the company is meeting with SAP this month to try and get R/3 code much earlier than it does now, Szerszen said.

IBM is also looking to double or triple its staff of SAP programmers to develop tools for R/3 database management and performance analysis, he said.

Separately, HP is shipping software that integrates SAP's CCMS event data with HP's MeasureWare and IT/Operations agents, and the PerfView performance management application. These packages cor-

relate SAP application response time with overall system behavior on a central OpenView IT/Operations console. They are intended to improve the availability and reduce the operating cost of SAP R/3 applications.

HP's Professional Services Organization also recently unveiled a service offering specifically for reducing the time and expense of implementing R/3.

"We worked directly with SAP on this integration so we have the key metrics that people would be interested in to do resource and performance management," said Craig Ledo, HP outbound marketing program manager.

CA appears to be the only major systems management vendor that hasn't been bitten by the R/3 bug.

The company has no products specifically for the R/3 market, but that could change when CA-Unicenter/TNG ships later this year, said Yogesh Gupta, senior vice president for product strategy

at CA.

"We recognize the opportunity," Gupta said. "We have a lot of clients who have come to us and said, 'Look, we would like Unicenter to manage SAP R/3 as well because it's part of our environment.'"

ON TOP OF THE MARKET

With a 35% share, SAP is the leading player in the estimated \$3.5 billion client/server applications market, according to The Yankee Group.

Connect Here.



NW 6/24 S

☐ Send me more information on GDC's SpectraComm 5000 series products.

I am interested in: (check all that apply)

- | | |
|---|--|
| ☐ ADVANCED NETWORK
ACCESS PRODUCTS (ANAP) | ☐ SERVICE SUPPORT (SS) |
| ☐ ATM PRODUCTS (ATM) | ☐ TECHNICAL TRAINING (TT) |
| ☐ INTERNETWORKING PRODUCTS (IP) | ☐ PLEASE HAVE GDC REPRESENTATIVE
CONTACT ME (SC) |

Name _____ Title _____

Company _____

Street _____

City _____ State/Country _____ Zip _____

Phone () _____ Fax () _____

1. Industry: (check one only)

- ☐ 01. Manufacturing
- ☐ 02. Finance/Banking
- ☐ 03. Insurance
- ☐ 04. Real Estate
- ☐ 05. Healthcare Services

☐ 06. Legal

☐ 07. Retail/Wholesale Trade

☐ 08. Transportation

☐ 09. Utilities

☐ 10. Education

☐ 11. Government State/Local

☐ 12. Government Federal

☐ 13. Military/Aerospace

☐ 14. Consultants

☐ 15. Carriers/Interconnects

☐ 16. Distributor/Reseller

☐ 15. Other _____

2. Job Function:

☐ 01. Corporate/Financial Mgmt.
(CEO, CFO, President)

☐ 02. MIS/DP Mgmt. (Dir, V.P.)

☐ 03. MIS/DP Staff

☐ 04. Communications/Networking Mgmt. (Director, V.P.)

☐ 05. Communications/Networking Staff

☐ 06. Engineering/Operations Mgmt.

☐ 07. Consultants/Analysts

☐ 08. Other _____

3. Purchase Involvement:

☐ Recommend (R)

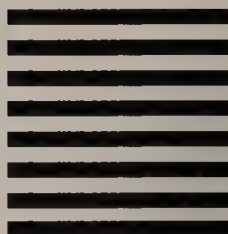
☐ Specify (S)

☐ Approve (A)

If you would like more information about General DataComm, please call 1-800-SWITCH-ON or (203) 574-1118, extension 6477.



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO 545 MIDDLEBURY CT

POSTAGE WILL BE PAID BY THE ADDRESSEE

ATTN DEPARTMENT 211
GENERAL DATACOMM INC
1579 STRAITS TURNPIKE
PO BOX 1299
MIDDLEBURY CT 06762-9980





Found On Top Shelves Everywhere.

It's the SpectraComm 5000 from GDC. And it's the height of achievement in managed access solutions. All part of GDC's Motivity™, a suite of products that makes seamless and efficient access to all central and remote sites a reality.

A "telco tough," high density rackmount system, SpectraComm 5000 integrates digital and analog circuits from remote branch offices to the central site via cost-effective T1/E1 or fractional services. An upgradable WAN server-based platform, it's perfect for today's networking needs, while providing an easy migration path to your future applications. And if you need 2B1Q or HDSL, we've also got it covered with our Universal Access System.

Also, SpectraComm 5000's unique graphical user interface, based on

HP OpenView standard GUI and SNMP platform, gives you complete control of your entire network.

And it's scalable, open and modular. So it seamlessly integrates communications from remote sites into Windows NT RAS and NetWare Connect servers for inherent remote LAN access.

Finally, a high performance, cost-efficient network access solution is well within your reach. Call for our free management briefing on *Motivity: Managed Access Solutions for the 21st Century*.

 **General DataComm**

Call 1-800-SWITCH-ON or <http://www.gdc.com>

If you build a better mousetrap,
will the world beat a path to your door?

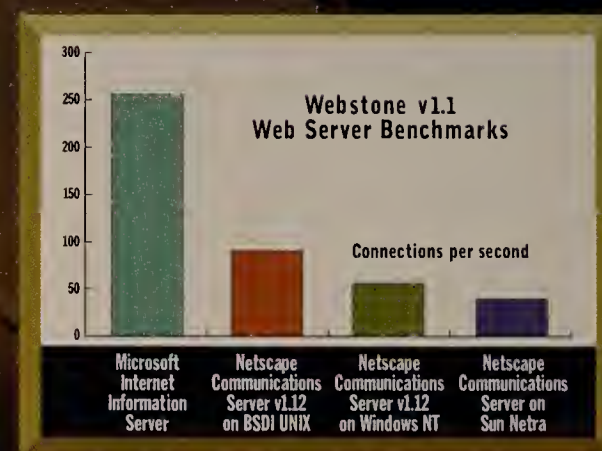
If you build a field of dreams,
will they come?

If you build a powerful,
easy-to-use Web server, will tens of thousands
of people download it?

Yes, yes, and definitely yes. It started with the release of a fast and powerful Web server — Microsoft® Internet Information Server. Now people are downloading it like crazy. (With over 70,000 registered downloads in two months, it's the most popular Web server going.



And in just six weeks' time, more than 2,300 companies deployed Web sites powered by Internet Information Server.*) Why the stampede? Grab a pencil. According to



Windows Magazine, Internet Information Server is "blindingly fast." In fact, it's four times faster than all other Windows NT -based Web servers," and executes Web applications up to five times faster than all other servers. So it's your best choice for publishing information on the Internet and intranet. And because it's fully integrated with Windows NT Server directory services, it easily fits into your existing internal network. What's more, as an integral part of BackOffice™, Internet Information Server brings even more power to your intranet. Oh, and it's free. Download today by visiting <http://www.microsoft.com/infoserv/>. Or call (800) 426-9400, Dept. A242, for the name of a reseller near you! You'll have the world of the Web at your door in no time.

Microsoft

WHERE DO YOU WANT TO GO TODAY?

WANs & Internetworking

Covering: Network Architectures and Management • Routers • Muxes, Remote Access Gear, Modems, PBXs and other CPE • Mobile Computing Products

Briefs

■ **Motorola, Inc.** last week introduced CopperGold, an **Asymmetric Digital Subscriber Line (ADSL)** transceiver that can probe local-loop phone lines to determine the maximum modem speed the line will support. CopperGold could be incorporated into ADSL modems to support 64K bit/sec to 1M bit/sec bidirectional service or 32K bit/sec to 8M bit/sec downstream. Such a modem could self-adjust its speed to line conditions or be preset by the service provider at increments of 32K bit/sec.

■ **Helpdesk vendor Vantive Corp.** has unveiled software that allows mobile users to easily retrieve customer information and application upgrades. Vantive On-the-Go software includes two components: Vantive Mobile application, which resides on the mobile computer and maintains data access permission schemes; and VanSync, which synchronizes data between the mobile computer and the corporate database. Vantive On-the-Go will be available in the third quarter with a new release of Vantive Sales, which features integration with Windows 95 and Windows NT, and Microsoft Office and BackOffice applications. Vantive: (800) 582-6848.

■ **General Magic, Inc.** last week demonstrated two **Internet applications** for handheld computers at PC Expo in New York.

PrestoMail, an electronic mail client, and PrestoLinks, a Web browser for the Sony Electronics, Inc. MagicLink and the Motorola, Inc. Envoy wireless communicators, are slated to ship at the end of the month.

■ **Proteon, Inc.** is now shipping the GlobeTrotter 70-U, an **ISDN remote access router** that the company claims achieves 8-to-1 data compression. The GlobeTrotter 70-U costs less than \$1,000. Proteon: (508) 898-2800.

Sterling revamps enterprise manager

Company aims Solve:NetMaster at NetView legions.

By Michael Cooney
Reston, Va.

Sterling Software, Inc. would rather see mainframe-based NetView users switch than fight.

The company last week announced a new version of its mainframe-based Solve:NetMaster software designed not only to let users more easily manage mixed SNA and TCP/IP enterprise networks, but also to save them thousands of dollars in

upgrade costs over IBM's NetView.

Solve is Sterling's suite of software tools for the mainframe-based NetView and workstation-based management platforms such as Hewlett-Packard Co.'s OpenView. Solve:NetMaster is the flagship package in the Solve line.

Sterling has for years fought a largely losing battle to dislodge NetView from IBM mainframe

Bay melds Xylogics, SynOptics gear for integrated ISP platform

By Jim Duffy
Burlington, Mass.

Bay Networks, Inc. last week fired the latest salvo in the battle to free up more lines for Internet access.

The company rolled out a raft of scalable products designed to address users' obsession with the Internet and to enhance the ser-

vice provider's ability to handle ever-increasing Internet calls.

The new products include an ISDN Primary Rate Interface remote access concentrator, called the Remote Annex 6300, remote access modules and eight- and 14-slot enclosures for housing those modules and others for routing, switches and shared-media LANs.

The new gear is targeted at small, midsize and large Internet service providers that need to gradually increase their call-handling and content-serving capacity without increasing point-of-presence square footage. In this marketplace, Bay is going head-

to-head with Cisco Systems, Inc., Ascend Communications, Inc., U.S. Robotics and Shiva Corp.

The Remote Annex 6300 is a stand-alone mixed traffic remote access server that is designed to eliminate the need for separate analog and ISDN access devices. It supports as many as 32 integrated V.34 modems for analog dial-up traffic and a single PRI for melding 23 64K bit/sec ISDN B channels onto a single circuit.

The 6300 also features an integrated PRI data service unit/channel service unit (DSU/CSU) — which eliminates the need for an external termination device — and support for PPP, SLIP, Multilink PPP and V.120 rate adaption for ISDN connections.

ISP Onramp Technologies, Inc. in Dallas is beta-testing the 6300. "It'll give us a one-box-does-it-all solution," said Mike Bishop, network engineer at Onramp.

The 5000 MSX supports dial access, routing, switching and shared-media LAN access in a single platform, enabling ISPs to connect remote users on the dial access ports to Internet content servers on the LAN ports through a single box.

For WAN access, the 5000

higher," claimed Tracy Hulver, product manager for Sterling's operations management division.

The new release of NetMaster, Version 3.2, has the additional enticement of being able to handle dates beyond the year 2000, Hulver claimed. NetView cannot handle dates after the year 2000, but IBM has said it will be able to in the future.

What's new in NetMaster 3.2

- ▶ VTAM 4.3 support
- ▶ Beefed up SNA and TCP/IP data trace facilities
- ▶ Year 2000 compliance
- ▶ Improved broadcast capabilities
- ▶ Support for SNA-Token Ring communications through IBM 3745 Model 900 expansion units

SOURCE: STERLING SOFTWARE

SNA users still may want to

wait for the next version of NetMaster before evaluating it, as Hulver said the company will be adding support for frame relay and IBM's Advanced Peer-to-Peer Networking in the next release, expected by early 1997.

The new release of NetMaster also features support for the latest release of VTAM, which controls communications in an SNA network via the mainframe.

The enhancements allow NetMaster operators to monitor error conditions, detect hardware failures and isolate problems more quickly than before, Hulver said.

In addition, the new release can work with Sterling's other Solve tools.

For example, Solve:Operations for SNA lets network administrators group and monitor users according to the work they are doing, such as billing, inventory or payroll, and monitor those business applications.

Solve:Operations for SNA can present enterprise resources to a NetView or NetMaster screen on the mainframe or to a graphics-based monitor on OpenView or IBM's NetView for AIX platform.

Solve:NetMaster 3.2 is available as a free upgrade to NetMaster 3.1 users. New licenses start at \$1,360 per month.

©Sterling: (800) 247-5163.

supported. EcoNet Version 2 also features enhanced reporting capabilities and support for Windows 95.

Yet EcoNet Version 2's appeal may be limited by its proprietary data collection schemes and its cost, which is about \$23,000.

"Certainly, if it was a standard, that would be much better," See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

EcoNet expands to switched nets

By Jim Duffy

Los Gatos, Calif.

Compuware Corp. last week unveiled a new version of its EcoNet application management software that features support for switched networks and high-speed, shared-media LANs.

EcoNet is the application traffic monitoring technology Compuware inherited from the acquisition of CoroNet Systems last year (NW, Nov. 13, 1995, page 14). The Windows-based software is designed to help users optimize network utilization by viewing the performance of application transactions across the network.

Version 2 of EcoNet now brings those capabilities to switched and 100M bit/sec shared-media networks, in addition to the 10M bit/sec Ethernet shared-media LANs it previously

A NEW ECONET

- ▶ Application performance monitoring for switched networks and shared 100M bit/sec nets
- ▶ Visualization of application traffic through routers and switches
- ▶ What-if performance optimization scenarios
- ▶ Enhanced reporting
- ▶ Windows 95 support

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

See EcoNet, page 20

EcoNet

Continued from page 19

ter," said Brian Burba, network management analyst at International Data Corp. in Framingham, Mass. "It will make it a tougher sell [because] it doesn't integrate into existing environments. But it's addressing a problem that's not necessarily being solved."

Support for switched networks is one

"What-if ..."

you could

- detect & diagnose network problems quickly,
- intelligently filter & correlate alarms,
- guide operators to quick problem resolution?

You can.

Gensym's G2® software allows you to quickly develop intelligent fault management systems for large complex networks. Working in real time, G2 filters and correlates alarm



messages, determines the root cause of a problem, and suggests operator actions. G2-based systems shorten repair times and improve network reliability. To learn more about Gensym's intelligent software systems, call us at 617-547-2500.



Tel 617 547-2500, Fax 617 547-1962
http://www.gensym.com

Circle Reader Service #35

such problem. This capability allows EcoNet users to gain visibility into the applications generating traffic through the switched environment. Typically, switch monitoring is limited to physical and data link statistics gathering.

But EcoNet Version 2 uses the port-mirroring and Simple Network Management Protocol Management Information Base variables of the switch to sample traffic across each port. This allows users to discover applications and measure the traffic load and response times for each application conversation. This data can then be used to build a statistical model of the application traffic patterns through the switch so users can make appropriate bandwidth sizing determinations.

Support for 100M bit/sec FDDI and Fast Ethernet connections also gives network managers a view of application performance across high-speed server and network backbone segments.

Application performance data can be reported in graphical or tabular form, and hotlinked into an Excel spreadsheet for capacity planning calculations. But there is still room for improvement here.

EcoNet Version 2 is available now. ■

Bay

Continued from page 19

MSX can house as many as 12 of the new Remote Annex dial access modules because two of the slots require a network management and Ethernet or routing module. The PRI module has the same features as the Remote Annex 6300 — 32 built-in V.34 modems and a single PRI. That means a 14-slot 5000 MSX can support 12 PRIs, or six PRIs and 180 simultaneous modem connections because the modems require two slots.

Bay's remote access roundup

- ▶ **Remote Annex 6300**
High-end, mixed traffic concentrator
- ▶ **5000 MSX**
Eight- and 14-slot chassis for remote access, routing, switching and shared-media modules
- ▶ **Remote Annex modules**
- ISDN PRI
- Channelized T-1
- Asynchronous dial-up

The channelized T-1 module also takes up two slots in the 5000 MSX chassis. It features 24 V.34 modems and a single integral T-1 DSU/CSU. As many as six of these modules can be housed in a 14-slot 5000 MSX for 144 simultaneous modem connections and support for six T-1s. The asynchronous module, meanwhile sports, 24 dial-in ports for high-density analog modem connections.

Pricing for the new products is based on configuration. For example, the Remote Annex 6300 with 24 V.34 modems costs \$20,595 and will be available in June. The 5000 MSX with three PRIs or channelized T-1s and 72 V.34 modems costs \$63,995 and will be available in July. A 5000 MSX with 12 PRIs costs \$89,495 and will be available in the fall.

©Bay: (508) 670-8888.

It's far from quiet on ADSL front

7M bit/sec over standard phone wires now possible via Paradyne product.

By Tim Greene

The future of broadband data and video transport over standard voice phone wires could boil down to a race that is as political as it is technical.

Last week, AT&T Paradyne surged ahead in the technical race with the introduction of Asymmetric Digital Subscriber Line (ADSL) technology that delivers 7M bit/sec downstream over a standard twisted-pair voice phone line.

That puts it 1M bit/sec ahead of a flavor of ADSL that is supported by a different underlying technology.

"This quiets any discussion that [the Paradyne technology] can't support higher speeds," Kieran Taylor, broadband analyst for TeleChoice, Inc., a consultancy in Verona, N.J.

The Paradyne 7M bit/sec modem technology is designed to support video applications, such as video on demand. It is the same technology announced two weeks ago as rate adaptive DSL (RADSL), but with firmware differences that allow only a fixed upstream and downstream rate. RADSL is designed for Internet access and other TCP/IP applications. Paradyne's 7M bit/sec fixed downstream technology for video is available now.

Paradyne's RADSL will be available in August with a downstream maximum rate of 2.3M bit/sec. That will be increased to 7M bit/sec downstream in November.

Lopsided need for speed

Because TCP/IP needs an upstream acknowledgment bit for every 10 downstream, the upstream and downstream capabilities must be in the proper ratio to get the full downstream throughput.

ADSL vendors are constantly upgrading the speeds of their products even as carriers and Internet service providers run trials of them in preparation to offer services later this year or early next.

Those services would feature broadband Internet access or video delivery.

The two faces of ADSL

Major players in ADSL hardware are split into two camps, with some supporting CAP and others DMT.

CAP	DMT
AT&T Paradyne	Amati
PairGain Technologies	Aware
Westell	Orckit
	PairGain Technologies

Given the newness of the market, the dominant vendor could be determined by key large orders from carriers.

Politics unusual?

Meanwhile, the political race is more complicated. Underlying ADSL are two competing modulation schemes: discrete multitone (DMT) and carrierless amplitude/phase modulation (CAP). Paradyne supports CAP, but the ANSI ADSL standard supports DMT.

Paradyne is expected next month to push ANSI to make CAP a second standard, and higher bandwidth and lower price point could influence that decision, Taylor said. DMT modems cost about \$2,500, and CAP modems cost about \$1,500.

©AT&T Paradyne: (800) 482-3333.

BusinessBriefs

Wireless gear maker **Ericsson** and internetworking company **Cisco Systems, Inc.** last week announced that they will collaborate on the development of systems that allow network operators to offer wireless Internet services.

The companies said they will provide end-to-end digital connections over the gamut of emerging digital circuit-switched technologies, but were not specific about time frames.

Cambio Networks, Inc. has named **Ann Zeichner** president and chief executive officer. She will replace Didier Moretti, who resigned to pursue other interests.

Prior to being named president and CEO, Zeichner was vice president of worldwide sales at Cambio. She has more than 16 years of sales and marketing experience in the computer networking industry, including stints at 3Com Corp., Centrum Communications, Inc., Ascend Communications, Inc., Fibermux Corp. and Micom Communications Corp.

Compuware Corp. has completed its acquisition of **Adams & Reynolds, Inc.**, a privately held client/server implementation services firm.

Adams & Reynolds had revenues of \$9.1 million in 1995. The company employs 134 people.

Terms of the acquisition were not disclosed.

Pacific Bell and **IBM** last week announced a partnership to bring users a portfolio of network equipment and services, including LAN design, monitoring and support.

Using the sales forces from Pacific Bell Network Integration and IBM's Integrated Systems Solutions Corp. (ISSC), the two will market services down to the desktop — something Pacific Bell could not offer before.

Pacific Bell fills a gap in ISSC's offerings by bringing networking services to the deal.

The two companies have been working together since the beginning of the year, with ISSC providing installation and maintenance of equipment that comes with packaged offerings.

How can you fax your customer, call shipping, and video conference with the branch office at the same time?

■ With Nortel's newest desktop business applications,

you can manage all your communications and messages

without ever leaving your desk. ■ By combining your

computer and phone, Nortel centralizes

your voice mail, e-mail, faxes, video

conferencing and more, right on your desktop. Just click and

you're in control. To check messages, read faxes on screen,

conduct personal video conferences, even share files

simultaneously, you hardly have to lift a finger. ■

Desktop business applications from Nortel, just one

component of our custom-designed enterprise networks.

■ For a free CD-ROM and demo disk,

you can reach us at 1-800-4 NORTEL,

dept 2H, or on the Internet

at <http://www.nortel.com>. ■

Just point and shoot.

NORTEL

NORTHERN TELECOM

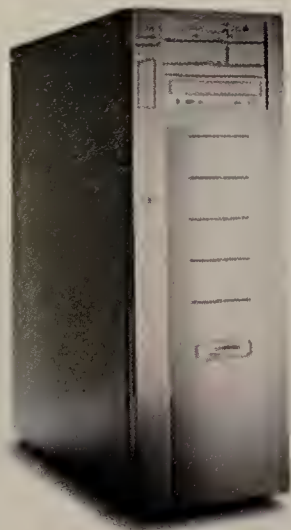
A World of Networks

Enterprise Networks • Wireless Networks
Broadband Networks • Public Carrier Networks

Now is a particularly good time to buy a Compaq ProLiant
4500 server. (As if there were ever a bad time.) That's
because from now until June 30, Compaq will give you an

BUY ANY QUALIFYING COMPAQ SERVER NOW
AND WE'LL THROW IN AN EXTRA PROCESSOR BOARD.
(Free)

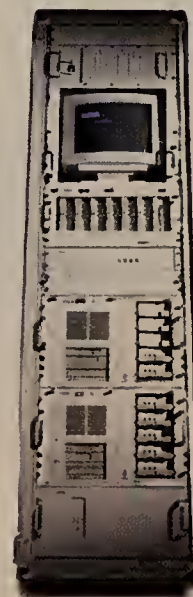
Compaq ProLiant 4500 Tower



additional processor board at no additional cost.*

Depending on the model you buy, that
can mean up to an 80% boost to the server's
performance. And if you decide later to upgrade
to Pentium® Pro technology, you can protect your investment
with our premium-free upgrade program.†

To take advantage of this offer, call your local
reseller today. Or call us at 1-800-410-8458 to locate
the Compaq Reseller nearest you. Buying a ProLiant
server is always a smart decision. Buying one now
could get you a corner office.



Compaq ProLiant 4500 Rack

COMPAQ

Has It Changed Your Life Yet?



© 1996 Compaq Computer Corporation. All rights reserved. Compaq registered U.S. Patent and Trademark Office. ProLiant is a registered trademark of Compaq Computer Corporation. The Intel Inside logo, Pentium and Pentium Pro are registered trademarks of Intel Corporation. Offer valid in the U.S. during 1996 only. *Qualifying models are ProLiant 4500 and 4500R 5/100 MHz and 5/133 MHz only. †Applies to all ProLiant 4500R models. Limit one upgrade per server. For more details on this offer call 1-800-410-8458. For more information on our full line of servers, call 1-800-345-1518 or reach us on the Web at www.compaq.com.

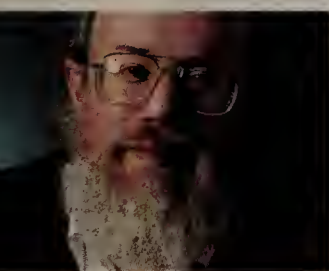
INTERNETWORKING MONITOR

A lively death indeed

It seems the mean time between death notices for the Internet is rapidly decreasing. In addition to the columnists' pontifications that I've been seeing for as long as there has been something identified as the Internet, stories are now showing up in what is called — for reasons unclear to me — the popular press.

A year or two ago, I'd see one such story every six months or so — usually a pronouncement by someone who felt that the telephone companies would soon need to take over and then all would be well; now the idea shows up in print (electronic or ink) multiple times a week. All too frequently it is someone who should know better.

While there are quite a few of these prognosticators of doom scattered about and viewing the state of the 'Net with alarm, there does not seem to be any sort of common assumption of a particular threat within this apoplectic community. There are almost as many reasons that the 'Net will die as there are people claiming that it will. It seems that the 'Net is about



Scott Bradner

to die due to clogging of the backbone combinations arteries, overloading on the servers, local Internet service providers (ISP) overcommitting their infrastructure, the aggressive cluelessness of many of the companies trying to bring the Internet to you, the lack of real-time support, the lack of an intervivor settlements procedure, the perceived absence of security.

Given that all of the above are true (as they are on one level or another), the Internet must be a hurting puppy. It is a wonder that anyone uses it on account of the fact that it is so popular.

But aren't these pundits holding the Internet to a higher standard than other technologies? Do these same people claim that the international phone system is broken because it is hard to get a dial tone in Chad? Should I pronounce U.S. telephone service dead because all too often I could not get a long-distance line out of Boston on my old long-distance carrier? Is the highway system broken because of a traffic jam in Chicago?

Why should the Internet and its various types of service providers not be subject to the same cyclical guess, try and respond process that just about all non-regulated industry is? For example, some people have complained that MCI's backbone was getting rather full and, as a result, some points in the backbone were losing excessive packets.

Let's see how this works: MCI bid for some of the interregional connections at the end of the NSFNet era and had its own projections about how successful it was going to be in selling Internet connec-

tions. MCI built a network to meet those projections. Traffic growth — both from the regional networks that took MCI up on its bid and from MCI's own customers — grew faster than the projections (by quite a bit). So after awhile, MCI figures

out a new set of projections and builds a backbone to meet those projections. This same sort of estimate, build, refine and expand process is what I would expect to see throughout the Internet.

The Internet is far from being about to die, or if it does it will be, as Elliott Norse said about another type of system, "a lively death indeed."

Disclaimer: With hundreds of years of history, Harvard always estimates cor-

rectly the first time, so they would not be familiar with the above concepts. By the way, the URL for Harvard president Neil Rudenstine's speech about the Internet (mentioned in my last column) is <http://www.das.harvard.edu/cis/rudenstine.html>.

Bradner is a consultant with Harvard University's Office of Information Technology. He can be reached at sob@harvard.edu.



Verilink's WAN access cards offer you easy, money-saving access to the winning suit of broadband services. We play it straight—so you can bank your savings.

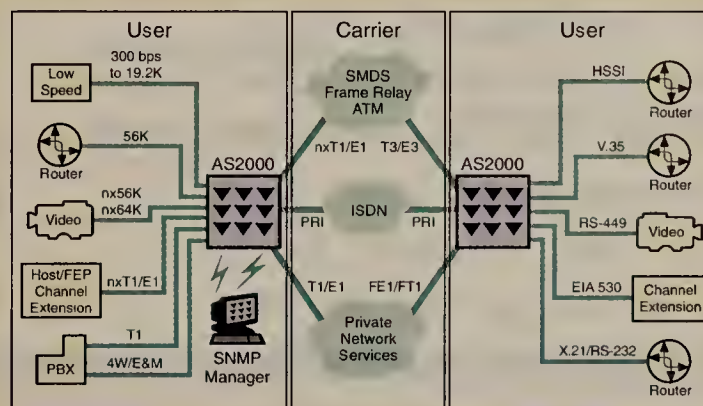
Verilink's AS2000 Integrated Access Cards stack the deck in your favor

Even when your network costs change, you'll still be holding the winning access cards.

No matter which service provides the bandwidth you need, tariff changes can quickly—and dramatically—affect your bottom line.

For Dave, reductions in leased-line costs, changes in calling rates, discount offers, and the availability of new services aren't wild cards—they're opportunities. Because AS2000's flexibility lets him squeeze the most out of his network. In spades.

The DS0/E0 micro-DCS capability lets Dave build circuits between any two data ports. Channel grooming guarantees that not one bit of bandwidth is wasted. Automatic band-



width allocation gives him the edge in resource management.

So, do like Dave. Deal yourself a winning hand every time with AS2000's universal platform. The most flexible way to build your network, keep your investments risk-free, and beat tomorrow's challenges hands down. All backed by a 5-year warranty.

For openers, call 1.800.VERILINK. Or look for us on the World Wide Web: <http://www.verilink.com>.



VERILINK

Circle Reader Service #30

Verilink Corporation • 145 Baytech Drive, San Jose, CA 95134 • Telephone number: 408.945.1199 • Toll-free number: 800.837.4546 • Fax number: 408.262.6260

Visit us at The Americas TELECOM '96 in Rio de Janeiro, booth #1.5245 and SUPERCOMM '96 in Dallas, Texas, booth #7098.



What if you could get heavy duty for the price of regular strength

More precisely, what if you could get carrier strength switching that ends up costing less than a conventional solution.



Presenting the Alcatel 1100 HSS™ multiservice switch from Alcatel Data Networks. This is the heavy duty technology that will take you to broadband. Depend on it to powerfully manage services, skillfully avoid rush-hour congestion, flexibly support the standards and protocols you need, and most importantly, pay for itself in the process. To learn more, call **1-888-ADN-2500** or (703) 724-2878, or visit <http://www.adn.alcatel.com>.



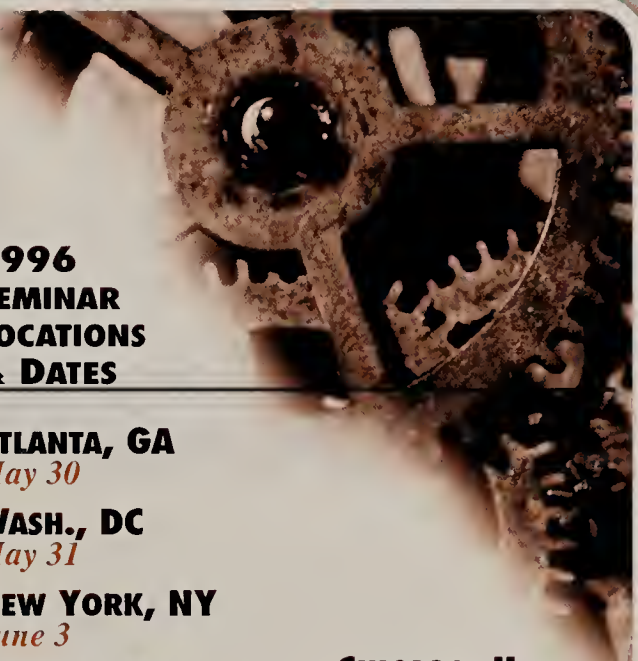
WE HELP YOU GROW

Intranets:

TECHNOLOGIES, TOOLS & STRATEGIES

Key Topics you don't want to miss!

- **ENHANCE**
information publishing
for users, workgroups
and the organization
- **INTEGRATE**
existing applications and
data into your Intranet
- **ESTABLISH**
and maintain the
security and integrity
of your Intranet
- **EVALUATE**
and select Intranet
products
- **much more!**
(see inside!)



1996 SEMINAR LOCATIONS & DATES

ATLANTA, GA
May 30

WASH., DC
May 31

NEW YORK, NY
June 3

BOSTON, MA
June 4

IRVINE, CA
June 11

SEATTLE, WA
June 18

SAN FRANCISCO, CA
June 19

MORRISTOWN, NJ
June 27

CHICAGO, IL
June 28

PHILADELPHIA, PA
July 23

DALLAS, TX
July 25

DENVER, CO
August 5

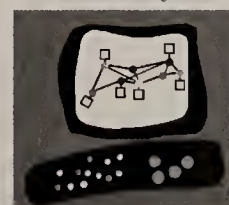
MINNEAPOLIS, MN
August 7

CINCINNATI, OH
August 8

**OFFICIAL
SPONSORS**



CHECK POINT
Software Technologies, Inc.



Call 1-800-643-4668

Maximize Your Corporate Information Resources

What do DHL, Northern Telecom and Ford have in common?
The answer is **Intranets**.

They are among the scores of companies of all sizes who have discovered the potential for an Intranet — an internal management information system based on Internet technologies. Intranets change the way we think about information access and distribution as well as transform network infrastructures.

According to International Data Corporation (IDC), Intranets are growing faster than the Internet itself. The number of Intranet Web servers now comprise 55% of total Internet servers and are expected to nearly triple in size this year to more than 200,000 and to exceed 4.5 million by the year 2000.

While Intranet Web servers today act mainly as document publishing systems, a number of vendors are now rapidly extending their functionality.

For example, Web servers are being integrated with databases, linked to mainframes and other legacy systems, and are providing workflow services. Combined with the high bandwidth capacity of corporate data networks, your organization can capitalize on advanced features such as real-time audio and video as well as collaborative applications and 3-D data representation.

Intranets: Technologies, Tools & Strategies is a practical, information-packed one-day seminar which offers you, a network manager, business strategist or corporate technologist, the first real opportunity to gain the insight and information you need to effectively leverage Intranet technologies. You will explore the leading and emerging tools which bring corporate Intranets to life, analyze current user case studies and learn how to implement a strategy for maximum corporate impact.

10 benefits of investing a day at this seminar

1. Gain detailed insights about the integration of corporate databases and other information sources with Intranet services
2. Explore the range of tools available for building, managing and using Intranets
3. Ensure that you make the right decisions about security on your Intranet including where and how to implement firewalls
4. Explore information publishing on your Intranet at the corporate, group and individual levels
5. Analyze the positioning of market leaders such as Microsoft, Netscape, Novell, Sun and Attachmate and how their plans will impact your Intranet solutions
6. Explore the future of Intranet technology with Sun's Java and the rendition of data in three dimensions with VRML
7. Learn the direction of Intranet-based groupware
8. Strategically plan your Intranet and quantify your Return-on-Investment
9. Learn how to select the best Web server products for your Intranet
10. Explore the theory and operation of Web servers



ON THE WEB

For information on all of our seminars, visit us on the World-Wide Web: <http://www.nwfusion.com>

Seminar OUTLINE

Intranets Redefine IT

At the heart of most Intranet systems are Web servers. These simple but effective information distribution mechanisms are becoming increasingly sophisticated as vendors extend and enhance their basic functionality. Intranets can also involve the use of TCP/IP as a transport and a number of TCP/IP applications that range from file transfer to audio and video distribution.

In this segment, you will learn components of Intranets and build a detailed MIS architecture and management model. We will also quantify the costs and constraints of building an Intranet and discuss the impact an Intranet can have on existing network infrastructures.

We'll cover:

- How the Internet has redefined information publishing
- How an Intranet differs from an Internet presence
- Why Intranets work
- Intranets as groupware solutions and integration strategies with Lotus Notes

CASE STUDIES 1:

Focus on Needs, Costs and Benefits

In our first set of case studies, you will examine a number of end users, including DHL, who have built successful Intranets. We'll discuss the needs that drove their Intranet development and, most importantly, the Return-On-Investment equation for real Intranets.

The Ten Pillars of the Intranet

To help you build your Intranet solution, we will cover the ten key steps of Intranet construction:

1. Planning: Quantifying the needs and wants of the organization in terms of Intranet deliverables
2. Design: Defining the architecture and implementation of Intranet systems
3. Security: Ensuring that the data and processes of your business are protected and their integrity can be assured

ON-SITE SEMINARS

4. Data: Planning and implementing access to both existing and new data sources. This includes accessing data external to the Intranet
5. Tools: Identifying the right tools for the job
6. Integration: Planning migration to an Intranet strategy
7. Promotion: Ensuring that the organization understands what the Intranet is for and sees it as a corporate and personal productivity aid
8. Training: Planning and implementing user and technical staff training for Intranet use and development
9. Support: Supporting and servicing your Intranet population
10. Management: Managing and controlling your organization's Intranet

Intranet Technologies

This section breaks down Intranet technologies to build a model of service. We start with the TCP/IP suite and detail the technical aspects of Intranet systems at each layer. Attendees will gain a thorough understanding of the benefits and consequences of each service and how it is implemented in commercial products.

This section will include:

- Transport Layer: High-speed local area access and its impact on Intranet performance and manageability
- Internet and Host Layers: TCP/IP and alternatives
- Application Layer: BOOTP, WINS, FTP, Gopher, News, HTTP
- Foundational Design: Security, integration with existing LAN systems, firewalls, network management, and reporting
- Web Server Backend Services: Common Gateway Interface and variants including: Standard CGI, Microsoft's ISAPI, Netscape's NSAPI, Novell's RCGI

Intranet Tools

In this section we will discuss and demonstrate tools to support user operations and activities including file access, Web browsers, groupware solutions (whiteboards and conferencing), electronic mail and

construction tools such as Web servers, Web server extensions, HTML editors and software development toolkits to build the Intranet.

We'll cover:

- Information services: Gopher, IRC, News, Talk, e-mail
- Web clients: Microsoft, Netscape, Spyglass derivatives and other choices
- TCP/IP application suites: Netmanage, Spry, FTP, Frontier
- Application development: Software Development Toolkits for Intranet use including products from Microsoft, Sun and Attachmate
- HTML editors: HotMetal, Frontpage, Blackbird
- Web servers: personal, group and corporate publishing systems based on Novell's Netware Web Server, Attachmate's Host publishing systems, Process Software's Purveyor, Netscape's Communications and Commerce Servers and O'Reilly & Associates Website
- CGI Scripting: Building backend services
- Integration: Linking your Intranet to your corporate information and databases as well as leveraging Lotus Notes
- Publishing: Information services on Intranets and linking them to the outside world
- Emerging tools: Adobe PDF, Shockwave, plug-ins, CU-SeeMe

CASE STUDIES 2:

Strategy and Implementation

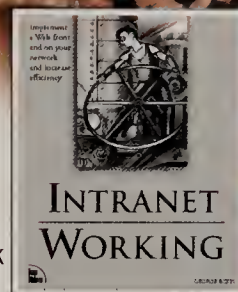
In our second set of case studies, we will look at Northern Telecom, Ford and other end users and examine how they built their Intranet solutions.

The Future of Intranets

In this concluding session, we will examine the future of Intranets and take a detailed look at the tools of the future with demonstrations of Sun's Java and Java Script as well as Microsoft's Visual Basic and VB Script and 3-D Data Rendition using Virtual Reality Markup Language.

REGISTER and You Will Receive . . .

- Comprehensive seminar workbook
- Copy of newly released *Intranet Working* by George Eckel
- Luncheon and break refreshments
- All of the above included in your \$395 registration fee



Note: If you can't attend, call us and order this informative and useful attendee materials kit for just \$99.95!

ABOUT THE PRESENTER

For over fifteen years, Mark Gibbs has developed technical and service operations, consulted, lectured and authored articles and books about PCs and networking. His areas of expertise include Internet and Intranet technology, Web design, electronic commerce, technology analysis, strategic planning, collateral development and high-tech marketing.



Gibbs is the author of the best-selling titles *The Absolute Beginner's Guide to Networking* (Sams Publishing, Second Edition 1995), and *Navigating the Internet* (Sams Publishing, 1993 and Deluxe Edition, 1994 and 1995). Gibbs is the editorial director for *Network World's* supplement, *IntraNet Magazine*, and has had articles published about PC and networking technologies for many periodicals including *Byte*, *Pen Computing*, *Inform Magazine* and *Office Computing Report*.

In conjunction with *Network World*, Gibbs has presented seminars to thousands of attendees nationwide including "NetWare 4.x Strategic Migration," "Capitalizing on the Internet," and "Capitalizing on the Web."

Gibbs was co-founder of the UK operation of Novell Inc., where he was responsible for the management of all technical services. He also worked for Novell's Strategic Marketing Group and Novell International. Gibbs is currently the president and principal analyst of Gibbs & Co., a consulting and analysis firm based in Ventura, California.

All Network World Technical Seminars are available for on-site training at your company. On-site seminars are a cost-effective and highly efficient way to train your staff. For more information, call 1-800-643-4668 and ask to speak with a representative about On-Site Seminars.

REGISTRATION FORM

Attendance Is Limited—Register Today!

CONFIRMATION

We will mail you a confirmation notice and complete course location information within 48 hours of receipt of your registration.

TEAM DISCOUNT

If three or more registrations are made at the same time for members of the same organization, you may deduct \$50.00 off each registration fee!

SEMINAR TIMES/LOCATIONS

Registration for this seminar will begin at 8:00 a.m. The seminar will begin promptly at 9:00 a.m. and will end at 5:00 p.m. The seminar meeting room will be posted in the hotel lobby. The luncheon room location will be announced at the seminar.

REGISTRATION 1

(please photocopy additional forms as needed)

NAME _____
TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
PHONE _____ FAX _____
INTERNET E-MAIL _____

HOTEL

We have reserved a limited number of overnight rooms on an individual call-in basis at each hotel for seminar attendees. If you require a room, please contact the hotel listed on your seminar confirmation form as soon as possible since the rooms are held for a limited time. When calling, please indicate that you will be attending the *Network World Technical Seminar* in order to receive a preferred room rate.

CANCELLATION POLICY

Cancellations must be received in writing at least 10 business days prior to the seminar date in order to receive a full refund. After this date, any cancellation will be subject to a \$125 cancellation charge, which may be applied to any future *Network World Technical Seminar*. Any registrant who does not attend a seminar and has not previously canceled will still be liable for the entire seminar fee. You may make an attendee substitution at any time. In the unlikely event that a seminar date must be canceled, Network World, Inc. will be liable for a refund of the seminar fee only.

CONTINUING EDUCATION UNIT (CEU)

The Continuing Education Unit (CEU) is the nationally recognized standard unit awarded for participation in qualified programs of Continuing Education. 0.65 CEUs will be awarded for each seminar day attended.

REGISTRATION 2

NAME _____
TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
PHONE _____ FAX _____
INTERNET E-MAIL _____

Intranets Seminar Dates & Locations

- ☐ MAY 30 ATLANTA, GA - CROWNE PLAZA RAVINIA
- ☐ MAY 31 WASHINGTON, DC - CRYSTAL GATEWAY MARRIOTT
- ☐ JUNE 3 NEW YORK, NY - DOUBLETREE GUEST SUITES
- ☐ JUNE 4 BOSTON, MA - ROYAL SONESTA
- ☐ JUNE 11 IRVINE, CA - RADISSON PLAZA HOTEL
- ☐ JUNE 18 SEATTLE, WA - SHERATON SEATTLE
- ☐ JUNE 19 SAN FRANCISCO, CA - ANA HOTEL

- ☐ JUNE 27 MORRISTOWN, NJ - HEADQUARTERS PLAZA HOTEL
- ☐ JUNE 28 CHICAGO, IL - ROSEMONT SUITES
- ☐ JULY 23 PHILADELPHIA, PA - DOUBLETREE GUEST SUITES/PLYMOUTH MEETING
- ☐ JULY 25 DALLAS, TX - TO BE ANNOUNCED
- ☐ AUGUST 5 DENVER, CO - TO BE ANNOUNCED
- ☐ AUGUST 7 MINNEAPOLIS, MN - TO BE ANNOUNCED
- ☐ AUGUST 8 CINCINNATI, OH - TO BE ANNOUNCED

METHOD OF PAYMENT (PAYMENT IS DUE PRIOR TO SEMINAR DATE)

COURSE FEE

Course fee includes seminar, course materials, luncheon and morning and afternoon refreshments.

Intranets: Technologies, Tools & Strategies

Number of Registrants _____ x \$395 =
\$ _____ Total Fee

☐ Check Enclosed
(Check made payable to Network World, Inc.)

☐ Invoice my company
(Copy of signed purchase order must be enclosed or faxed)

☐ Bill my credit card
☐ MasterCard ☐ VISA ☐ American Express

Account Number _____

Expiration Date _____

Name on Card _____

Signature _____

3 EASY WAYS TO REGISTER:



Phone . . .
Our toll-free
registration line at
800-643-4668
508-820-7493
(9:00 A.M. — 5:30 P.M. EST)



Fax . . .
THIS FORM TO
508-820-1283
(24 HOURS A DAY)



Mail . . .
THIS FORM TO
NETWORK WORLD
PROFESSIONAL
DEVELOPMENT GROUP
161 WORCESTER ROAD
FRAMINGHAM, MA
01701-9172

☐ I am unable to attend. Please send me the complete attendee materials kit for the Intranet Seminar for just \$99.95 plus \$6.95 for shipping and handling.

Carrier Services

Covering: Local and Long-Distance Services • Value-Added Networks • Cable, Satellite and Wireless Networks • Regulatory Affairs • Carrier-Based Internet Services

Briefs

MCI Communications Corp. last week announced a store-and-forward 800-number fax service.

MCI becomes the collection and delivery agent for the faxes, and will forward them to the user's fax machine, LAN, internal electronic mail system or host computer. This way, those sending faxes never get a busy signal, MCI said.

Pricing for the service is 45 cents per minute plus normal MCI 800 charges.

AT&T last week announced its EasyLink messaging services portfolio now includes a gateway that hooks LANs to AT&T Mail, the carrier's wide-area mail service.

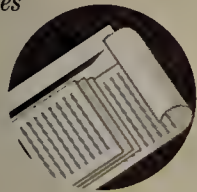
The gateway software is free and extends Microsoft Mail, cc:Mail and GroupWise messaging over the AT&T global network, the company said.

Four Baby Bells have banded together to offer voice messaging services that can span the carriers' geographic footprints.

Under the name The Messaging Alliance, Ameritech Corp., Bell Atlantic Corp., NYNEX Corp. and Pacific Bell agreed to share their voice messaging address databases so voice messages can be exchanged among their networks.

Stentor, an alliance of Canadian carriers, is also part of The Messaging Alliance.

Carrier equipment supplier DSC Communications Corp. has petitioned the Federal Communications Commission to set aside radio spectrum for fixed wireless local-loop access. DSC claims its Airspan system of paired wireless terminals at the central office and customer premise can help carriers offer cost savings to users, compared with landline local access. Lucent Technologies, Inc. and other equipment vendors have been urging similar action by the FCC.



Will tumbling CDPD prices generate higher demand?

By Joanie Wexler

Network managers who have put off investigating wireless data might soon start coming around.

That's because wireless network operators have been slashing the prices of Cellular Digital Packet Data (CDPD) services and shifting to flat-rate pricing models. The more attractive

Industrywide, there is full CDPD coverage in 44 markets today, according to the CDPD Forum in Chicago. But full roaming among carriers' nets is limited to the AT&T and Ameritech markets so far.

Still, lower prices might eliminate one barrier for busy network managers.

"With downsized staffs and

What CDPD costs

Carrier	Low-end plan (per month)	High-end plan (per month)
AT&T Wireless	\$22 for 200K bytes	\$145 for 4M bytes
Bell Atlantic NYNEX Mobile	\$14.95 for 100K bytes	\$89.95 for about 2.2M bytes
GTE Mobilnet	\$15 for 125K bytes	\$99.95 for 3M bytes

With all three carriers' services, the per-kilobyte price declines as users commit to the larger usage plans.

pricing might encourage managers to at least do the math on what it takes to arm mobile workers with wireless modems and services, observers said.

AT&T Wireless Services, for instance, last week instituted a new five-tiered pricing model that cuts its rates by up to 60%. The move follows Bell Atlantic NYNEX Mobile's, which earlier this month cut prices by 70%. GTE Mobilnet, Inc. kicked off the reductions in January when it chopped airtime in half.

Generally, the carriers' pricing includes a flat, per-month fee plus usage (see graphic).

Observers agree that lower price points for the fledgling wireless packet data service are important, but these alone will not send users flocking to CDPD.

Lower prices are "necessary while carriers work on other factors, such as getting a nationwide footprint," said Bill Frezza, president of Wireless Computing Associates, Inc., a consulting firm in Yardley, Pa.

AT&T Wireless, for example, has CDPD operational in 16 markets today. Its new prices also apply to partner Ameritech Cellular Services' six markets, where a CDPD interoperability agreement means users can now roam among the two carriers' nets.

reduced budgets, net managers already have their hands full," said Phil Evans, director of telecommunications at Perot Systems Corp. in Dallas. "High prices can be a convenient crutch to put off learning" about wireless data, he said. ■

NASA having a blast with Sprint ATM

Agency moves after Sprint saves its government contract.

By David Rohde

Washington, D.C.

ATM may be an expensive technology, but try telling that to Carl Stover. The network professional is counting on Asynchronous Transfer Mode to reduce the overall cost of the National Aeronautics and Space Administration's multiple communications networks.

Faced with congressional budget cuts, NASA has agreed to use Sprint Corp.'s ATM network following tests of both Sprint's and AT&T's commercial ATM services. The agency will subscribe to Sprint's service under terms of the federal government's giant Federal Telecommunications System (FTS) 2000 contract for civilian agencies.

AT&T's and Sprint's ATM services, the only two approved FTS 2000 carriers, were recently added to the contract.

"At NASA, like all other federal agencies, we're figuring out ways to do more with less," said

NASA's rationale

Here's why NASA expects to migrate from multiple WAN technologies, including an AT&T T-3 backbone, to a Sprint ATM network:

- ▶ Budget cuts demand consolidation of separate network architectures.
- ▶ NASA views private lines as too expensive for bursty applications.
- ▶ Only Sprint could provide OC-3 ATM to meet increasing bandwidth needs.
- ▶ The agency wants a technology capable of handling multimedia traffic.
- ▶ The GSA modified the FTS 2000 contract to allow NASA to keep voice traffic with AT&T while migrating data nets to Sprint.

Stover, NASA's wide-area network program manager. "For the transmission element of our budget, we believe we can get more bang for our buck [with ATM]."

Sprint's ATM service will be used to integrate data, video and conferencing applications running under both of NASA's big WANs as well as some smaller nets, Stover explained. Currently, the Program Support Communications Network runs over a T-3 backbone network with numerous tail circuits linking NASA sites and its principal contractors. Meanwhile, the NASCOM network — dating back to the 1960s — carries mission-critical traffic relating directly to space flights.

Historically AT&T customers, NASA's engineers were dissatisfied that AT&T could not provide ATM service at OC-3 speeds and that a card within AT&T's switch represented a single point of failure, Stover claimed.

"Our users have become very intolerant of downtime," he said.

Sprint officials said the contract win is noteworthy because decisions about FTS 2000 are usually made almost entirely on price, not technical capabilities. Until recently, the government had been threatening to remove Sprint from the contract until it agreed to lower its average FTS 2000 long-distance prices to 5.8 cents a minute, following a big reduction in AT&T's rates. ■

Bell Atlantic makes VPN bid

By Tim Greene

Philadelphia

Users in the Middle Atlantic States can look forward to virtual private telephone networks within Bell Atlantic Corp. local calling areas.

While that may not seem like a very practical service now, it sets the stage for Bell Atlantic to soon rival the VPNs offered by long-distance carriers.

Bell Atlantic last week announced that it would offer local VPNs within its region starting in September, but the announcement has broader implications. The carrier plans to offer long-distance VPNs as soon as the Federal Communications Commission gives the OK.

"They're trying to beat everyone else to the market," said Eric Paulak, a telecommunications analyst with Gartner Group, Inc., referring to other regional Bell operating companies, which are

also gearing up to enter the long-distance market.

As a practical matter, most users will not have a need for a strictly local VPN, Paulak said, but offering the service now sends a message. "It lets potential customers know if they're going to put their VPN out to bid in 1997, they may want to consider Bell Atlantic," he said.

Bell Atlantic said interexchange carriers could resell Bell Atlantic's local VPN service so they could offer a local/long-distance VPN package.

The company said price would be determined by fixed costs, such as setting up account codes and recurring costs. Rates would also depend on use.

Bell Atlantic estimates that 25% to 75% of local phone traffic could be on a local VPN, where it could be subject to the lower rates that make VPNs attractive to users. ■

what if
everyone in the world agreed on everything?

well, what if
millions of people agreed on something?

OK,
what if some of the biggest companies to deploy



It's unanimous. Microsoft® Exchange is a messaging system you can count on. Why else would major corporations across the world (along with tens of thousands of users) already be using Microsoft Exchange to support mission-critical operations? Like you, they wanted reliability. They wanted a messaging solution to meet current e-mail needs yet extend

Just some of the companies using Exchange for more than a year:

Texaco • Digital • MCI • Chevron • Nabisco • Dun & Bradstreet • EDS • Zeneca • BASS • Kentucky Department of Education
Labatts • Intergraph • Telestra • Federated Department Stores • University of Alabama • Oregon State University

We designed a global messaging architecture two years ago. We have over 26,000 D&B associates worldwide. By deploying Exchange last year, we were able to leverage our current architecture and provide a much more scalable and robust platform to engineer our business processes.

—Don Smith, Dun & Bradstreet

Because we have so many employees on the messaging system, it has to allow us both centralized control and administration and has to appear seamless and responsive to our employees. We are deploying Microsoft Exchange Server because it delivers these capabilities.

**—Charlie Pereira, End-user Computing
Tools/Electronic Messaging Manager, Chevron**

With our domestic sales organization and headquarters on Exchange, we see Exchange as the technology backbone for supporting a collaborative approach to our sales efforts and enabling us to put regional sales directories in closer contact with headquarters.

**—Eric Iversen,
Director of Applications Development, Nabisco**

Microsoft Exchange agreed on one thing?

their infrastructure to embrace groupware and the Internet. The prevailing opinion? Microsoft Exchange. You can quote them on it. To learn how companies are using Microsoft Exchange today, call (800) 426-9400, Dept. A492, for a copy of the Microsoft Information CD.

Or visit our Web site at www.microsoft.com/exchange/.

Microsoft

WHERE DO YOU WANT TO GO TODAY?



16.7 million colors, yet it goes with everything.



Introducing the network compatible, Color Laser Beam Printer 360PS.

You want a color laser printer that stands out. But it's got to go with your network, right? Then the new Color Laser Beam Printer 360PS from Canon is the perfect match for your business.

The Canon C LBP 360PS puts all 16.7 million colors of the rainbow within your reach. It's plug 'n' play, and connects easily with Macintosh®, Windows™ and UNIX operating systems, plus Ethertalk, TCP/IP, and Novell® IPX networking environments. Innovative Fiercy XJ Downloader™ and Spooler™ software give you unmatched flexibility when downloading PostScript™ files and  Adobe PostScript managing network printing. Which means while you print, your computer is free to go on to the next job.

And because Canon's the leader in laser technology, you'll see vivid, continuous tone color at blinding speeds. With the built-in Fiercy™ XJE™ controller,  the C LBP 360PS prints out 3 full-color pages per minute, with a resolution of 600 dpi. Plus, it feeds letter-or legal-size paper with a capacity of up to 600 sheets. In fact, the C LBP 360PS makes color printing so efficient, it can't help but make you look good.

So if you're looking for a high-quality, color laser printer to go with your network, we have the system that is the solution. The C LBP 360PS from Canon. For more information, just call 1-800-OK-CANON. Or visit us on the Web at <http://www.usa.canon.com>

Canon

Macintosh is a registered trademark of Apple Computer, Inc.
Fiercy, Fiercy XJ Downloader, Fiercy XJ Spooler and XJE are trademarks of Electronics for Imaging, Inc.
PostScript is a trademark of Adobe Systems Incorporated, registered in the U.S. and other countries.
Novell is a registered trademark of Novell, Inc.
Windows is a trademark of Microsoft Corporation.
© 1996 Canon U.S.A., Inc.

Circle Reader Service

Local Networks

Covering: Operating systems • LAN management
Hubs • Switches • Adapters and other equipment

Briefs

■ In a summary judgment handed down last week, a U.S. District Court judge ruled that the president of RTI Corp. could not use bankruptcy in responding to a **software piracy law-suit** filed against him by **Novell, Inc.** Novell, which filed the suit in late 1994, charged that Killeen, Texas-based RTI sold counterfeit versions of Novell software to several branches of the U.S. Army. In 1995, RTI filed for Chapter 11 protection. Novell: (800) 757-2837.

■ **Server Technology, Inc.** of Sunnyvale, Calif., last week introduced a product that allows systems administrators to initiate logoff, shutdown and power reboot of unattended remote **Windows NT servers.** The Sentry ShutDown Remote Power Manager is an intelligent power switch controller that lets a network manager log on to the remote server via a multi-level password interface to initiate a shutdown or power-off using the Windows NT uninterrupted power supply low-power monitoring function. The product is available now for \$669. Server Technology: (800) 835-1515.

■ **McAfee** of Santa Clara, Calif., has announced Version 2.5 of its VirusScan software for Windows 3.X machines. The **antivirus software** monitors PCs in real time, preventing the execution and spread of over 8,000 viruses without consuming memory resources. Once a virus has been located, VirusScan can be configured to take advantage of end user- or administrator-defined actions such as deleting, quarantining or repairing files, or to display custom messages and instructions. VirusScan 2.5 for Windows 3.X will begin shipping in July for \$65. McAfee: (408) 988-3832.

3Com bulks up its stackable hubs

SuperStack II provides port switching, hot-swappability and advanced management.

By Jodi Cohen
Santa Clara, Calif.
3Com Corp. last week rolled out a line of Ethernet and token-ring stackable workgroup switching hubs that boast sophisticated features typically found in chassis-based products.

The SuperStack II family, which builds on 3Com's existing SuperStack gear, provides customers with port switching, graphics-based network management, hot-swappable components and uninterrupted power supplies.

3Com's stackable products have proven popular in branch offices, but the company is aiming higher with the new line, according to Tam Dell'Oro, principal of the Dell'Oro Group, a consultancy in Menlo Park, Calif.

"3Com was hoping to get into more headquarters facilities with the Chipcom chassis cus-

The switching hubs — which can be stacked up to 10 units high — also include Simple Network Management Protocol and Remote Monitoring (RMON) support.

For token-ring customers, 3Com rolled out its SuperStack II Switch 2000. The 12-port token-ring switch provides an optional slot for high-speed technologies such as FDDI and Asynchronous Transfer Mode.

All of the new SuperStack II products provide increased reliability over 3Com's existing stackable gear with new features like a hot-swappable cascading unit, which allows units to be removed or added without bringing down the network, and uninterruptible power supplies

that maintain the safe operation of network equipment during power surges or blackouts.

3Com's new SuperStack II products

Product	Description	Pricing	Availability
SuperStack II Port Switch Hub	Ethernet switching hub	\$1,499 (12-port twisted pair); \$2,199 (24-port twisted pair)	July
SuperStack II Switch 2000TR	12-port stackable token-ring switch	\$8,000	July
SuperStack II Enterprise Monitor	RMON probe	Less than \$10,000	August

3Com also made some related announcements on the management side. The company unveiled its Transcend SuperStack View, a graphical application

that presents net managers with a view of all devices in an Ethernet or Fast Ethernet SuperStack II environment.

Also on the management front, 3Com unveiled the SuperStack II Enterprise Monitor RMON probe. The probe, derived from 3Com's acquisition

of Axon Networks, Inc., monitors multiple Ethernet, Fast Ethernet, FDDI and token-ring networks.

©3Com: (408) 764-5000.

High-speed LANs

Intel offers Fast Ethernet for both new and old cabling

By Jodi Cohen
Hillsboro, Ore.

Intel Corp. last week rolled out a Fast Ethernet hub and adapter that will satisfy customers with new or old cabling.

The 100Base-T4 models of Intel's Express Stackable Hub and EthernetExpress Pro/100 Adapter — the company's first 100Base-T4 offerings — support Category 3, 4 and 5 wiring.

The hub, which was codeveloped by Bay Networks, Inc., pro-

vides 12 100M bit/sec Ethernet ports within a collision domain.

Customers deploying Fast Ethernet in a mix of old and new buildings can stack the 100Base-T4 hubs with those based on 100Base-TX, which runs over two pairs of Category 5 wire.

The 100Base-T4 adapter operates at 10M or 100M bit/sec and is designed for PCI bus machines. The card provides support for most major network operating systems, including

technology, which allows customers to upgrade and change an adapter's microcode without replacing the entire card.

Intel joins a handful of players, including 3Com Corp. and Cogent Data Technologies, Inc. (recently acquired by Adaptec, Inc.), that offer 100Base-T4 products.

While many customers are deciding to upgrade to Category 5 cabling at the same time they move to Fast Ethernet, others are migrating to 100M bit/sec while maintaining their wiring infrastructure, said Shirley Turner, a product manager at Intel. "We're estimating that 100Base-T4 will be 15% to 20% of our 100M bit/sec sales," she said.

In addition, Intel rolled out LANdesk Network Manager, a Windows-based software management application that provides Simple Network Management Protocol support for configuration, performance and fault management of Intel's Fast Ethernet hubs and switches.

Pricing for the Ethernet Express Pro/100 Adapter in a 20-pack is \$149, and the product is available now. The Express Stackable Hub will be available in the third quarter for \$2,375. The LANdesk Network Manager software is priced at \$995 and is available now.

©Intel: (800) 538-3373.

Fast Ethernet facts

Customers must select the correct 100M bit/sec Ethernet products for their particular cabling infrastructure.

Fast Ethernet type	Cabling type	Cabling description
100Base-T4	Category 3, 4 and 5 UTP; 4 pairs	Common cable found in most existing buildings
100Base-TX	Category 5 UTP; 2 pairs	Expensive wire found in newer buildings
100Base-FX	Multimode fiber; one pair	Expensive cable used for longer distances

vides 12 100M bit/sec Ethernet ports. It can be used to deliver high-speed connections to a backbone, server or desktop.

The device can be stacked up

Windows NT and Windows 95, NetWare and IBM LAN Server.

In addition, the network interface card supports Intel's recently announced Adaptive

Download our hub Buyer's Guides on Network World Fusion. Select News+ then Local Networks.



NET RESULTS

Bay's timing is all wrong

They say what separates the great comedians from your average jokesters is timing. Maybe Bay Networks, Inc. should have consulted Jerry Seinfeld before it made its latest acquisition announcement.

Bay's move — last week acquiring Penril Datability Networks, Inc.'s Digital Signal Processing (DSP) modem business for about \$120 million in stock — appears to be a pretty sound one on the surface.

It gives Bay internal development

control over the modem technology that will be an essential cog in making its new Internet/telecom business unit successful.

This unit's goal is to offer Internet access and give service providers cost-effective, top-notch, high-density remote access devices. The majority of those customers will require dial-in schemes, which means modem technology.

All future remote access products from

Bay that come equipped with integrated modems will contain the DSP technology. (The acquisition is expected to be completed in September.)

Bringing the technology in-house will allow Bay to dramatically reduce the cost of its modem-based remote access devices by as much as 50%, according to company officials.

But here comes the part about timing.

On the same day that Bay made its acquisition announcement, the company put out a second press release detailing new offerings being added to its multiservice access product line for service providers. A couple of these products will have integrated modems, but they will be from Microcom, Inc., a company with which Bay has an existing OEM deal.

So, on the very day that Bay announced its future modem direction, it released a new set of products, including some based on its old modem direction. This type of timing can only be described as brilliantly shortsighted. This may be the first time in history that a company has obsoleted a product line on its actual announcement date.

The timing issue is so glaring, it actually detracts from two announcements that, on their own, seem to be very solid. With the new multiservice products, we're really starting to see how well Bay has leveraged its Xylogics acquisition. And the Penril move reinforces Bay's commitment to remote access overall with an emphasis on reducing end-user costs.

In and of itself, the situation is not all that uncommon in this consolidation phase we seem to be stuck in. Every week, companies buy other companies that portend the end of some existing relationships or the eventual phaseout of a product line. The Bay/Penril deal is no different in that regard, and we believe this will be a smart move by Bay in the long term.

It's the timing of the issue that leaves us baffled. Hey, why not wait a week or two to roll out the Microcom-based stuff? Despite the strength of the announcement, Bay comes off looking a bit disorganized.

But, at least we can say that Bay warned us. In a footnote to the Penril press release (mind you, this is a direct quote) Bay states, "This release, other than historical financial information, may consist of forward-looking statements that involve risks and uncertainties. These statements may differ materially from actual future events or results."

Nothing like making a bold statement of direction and then qualifying it with a disclaimer.

Le Baron is a research director and MacAskill a senior research analyst in Gartner Group, Inc.'s Network Computing Infrastructure group. They can be reached at inquiry@gartner.com or (203) 316-1111.



**Skip MacAskill and
Melinda Le Baron**



**SECURITY
PASS**

A.M.W. Limited

EXPIRY DATE 03/31/97



SCOTT PRESTON

He's 29.
Has 3 degrees.

Lives on caffeine and
jelly rolls.

Works for your
competitor.

And right now he's
downloading your inventory
projections.

You don't know him. But he might know you. The fact is, hackers are virtually everywhere. And if your network isn't protected by a BorderWare firewall, it's not as secure as it should be.

BorderWare is the first firewall designed to be as smart about time and money as it is about security. It's the only firewall that's up and running in hours, not days.

It offers total transparency to all authorized users, so existing software and procedures don't need to be modified, and no one needs retraining. It runs its own diagnostics.

What's more, it doesn't require expensive workstations. In fact, BorderWare operates on an Intel® processor.

As well, it has everything you need to link to the Internet: Mail, News, WWW, FTP and DNS. And it combines packet filtering with both application-level and circuit-level gateways.

BorderWare also enables you to define proxies for secure and specialized applications through the firewall. It responds to attacks and initiates alarms. And is configured to grow as you and your enterprise do.

It's an impressive list of features. But it has to be. Because the whole world, unfortunately, is watching.

<http://www.borderware.com>

BORDERWARE™

Nobody Comes Close

All trademarks are the property of their respective owners.

Call us at 1-800-334-8195 or +1(416) 368-7157. Fax +1(416) 368-7789. 20 Toronto Street, Suite 400, Toronto, Ontario, Canada M5C 2B8.



How hard is it to
attract customers
to your ATM
services?

Doesn't look
too tough, does it?

■ The Nortel Magellan Vector ATM switch can make you irresistible



to the lion's share of the private ATM network market. ■ We

developed it with FORE Systems, a leader in ATM technology, so interoperability

with most ATM applications is assured. But we didn't stop there. ■ Magellan Vector offers

superior traffic management, user-address screening and verification for heightened network

security, and 1-to-1 component redundancy, so there's no single point of failure. ■ Nortel's

expertise in WANs coupled with FORE's dominant ATM premise position will make your

services more attractive than ever to the private ATM network market. ■ To learn more

about Magellan Vector, reach us at 1-800-4NORTEL, dept 07. Or on the Internet at

<http://www.nortel.com>. ■ Visit Nortel at SUPERCOMM '96, Booth 3238.

NORTEL
NORTHERN TELECOM

A World of Networks

Broadband Networks • Enterprise Networks
Wireless Networks • Public Carrier Networks



Microsoft redefines 'open' with CIFS

Microsoft Corp.'s recent Internet Strategy Day was marked by a huge outpouring of announcements, some of which were actually newsworthy.

In a future column, I'll come back to Active Desktop (the former Nashville release of Windows 95) and add a new spin on Windows NT 4.0 directory services. But this week I'll drill down on

one piece of news. The company's press release trumpeted the news with the headline: "Microsoft Windows NT Server Is More Open Than Unix, Survey Finds." Now, if you thought that "open" referred to publicly available standards and APIs maintained by an independent group — as opposed to the proprietary nature of those controlled by a single vendor — Microsoft says you're wrong.

"The definition of openness is chang-

ing in the age of the public network," said Gary Voth, a Microsoft group product manager.

What's it changing to? Microsoft is glad you asked. According to the release, "In defining openness, customers said the most important factors are interoperability, choice of solutions and upward compatibility." This apparently means that, when given a question to choose the parameters of openness, a large number of people didn't have a clue as to what it meant.

Using this reasoning, the right answer on a test becomes the answer chosen by the most people. This thinking would certainly have changed the grade point averages for many of us in college — some for the better, but many for the worse.

Microsoft's announcement boiled down to the establishment of the Common Internet File System (CIFS) protocol as an open industry standard for network file services. The announcement states, "CIFS technology provides secure, direct read and write access to files stored on remote computers without requiring users to download or copy the files to a local machine first. CIFS is based on the standard network file service protocol for Microsoft Windows, Windows 95 and Windows NT operating systems that enables client workstations to access network information over TCP/IP."



Dave Kearns

The many of us using Network File System to do exactly this may wonder what the fuss is about since NFS is already an open standard. True, it was formulated by Sun Microsystems, Inc., but it is now controlled by standards groups.

The catch is that Sun has partnered with Microsoft rival Netscape Communications Corp. in the Web browser war, so Microsoft needs an alternative to the Sun standard.

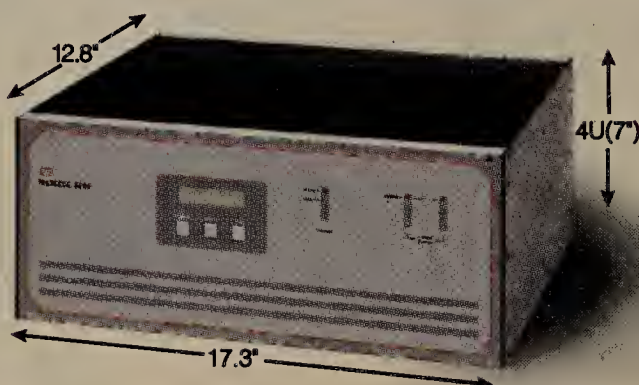
Thus, we are treated to CIFS, based on

Headline:

Voice over Frame Relay with an integrated hub.

Toll Quality Voice

Photo:

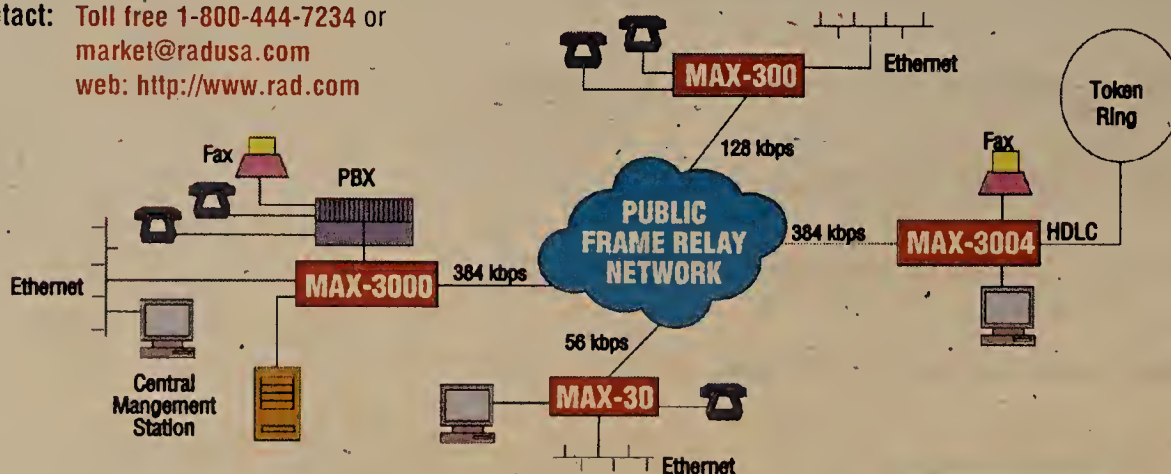


Product name: **MAXcess-3000**

Product description: **Integrated switching hub**

Product benefit: Efficient band width management integrating toll quality compressed voice (MPMLQ), fax data and LAN over frame relay or leased lines at data rates up to 384 kbps. LANs adaptively sharing bandwidth with many (36) voice channels. Ideal for drop & insert of multiple sites or star configurations. Resilience to noise and clock slippage. Central SNMP management. Various hub sizes for any application.

Contact: Toll free 1-800-444-7234 or
market@radusa.com
web: <http://www.rad.com>



Boring ads. Brilliant solutions.

RAD

data communications

RAD Data Communications, Inc.

e-mail: market@radusa.com Toll Free: 1-800-444-7234

U.S. Headquarters: 900 Corporate Drive, Mahwah, NJ 07430 Tel: 201/529-1100 Fax: 201/529-5777 Midwest: Tel: 708/342-9999 Fax: 708/342-9986
West Coast: Tel: 714/897-2448 Fax: 714/891-1764 International Headquarters: 8 Hanechoshet Street, Tel Aviv 69710 Israel Tel: 972-3-6458181 Fax: 972-3-6498250

Tip of the week

American Power Conversion Corp., the uninterruptible power supply company, has introduced a desktop product called Work-Safe. In the event of a power outage, Work-Safe will close down applications safely, save work in progress and shut off the operating system. It works with Windows 3.X, Windows 95 and Windows NT. Check <http://www.apcc.com/> for details.

Microsoft's Server Message Block technology, which has been shown to be the biggest obstacle to faster throughput on Windows NT networks. The humorous note is that Microsoft intends to "promote CIFS as an open industry standard through a number of vehicles, including the Internet Engineering Task Force."

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at dkearns@msn.com.

NetworkWorld

September 10-12, 1996, Boston, MA

UNPLUGGED



FAX this card to
DCI: 508-470-0526



MAIL this card
to DCI



*E-Mail us at ConfReg@dcexpo.com

World Wide Web access at URL <http://www.DCIexpo.com/>

*When responding by E-Mail, please refer to your customer code and Network World Unplugged in the subject line. Include your name, title, company, conventional mailing address, including mail stop, telephone and fax number.

Yes!

☐ Please send me a Brochure (5481)

☐ Please register me for the FREE Exposition (5571)

Name: _____

Title: _____

Company: _____

Address: _____ Mail Stop: _____

City/State/Zip: _____

E-Mail Address: _____

Tel. (____) _____ Fax: (____) _____

Customer Code: OQAWN00

PLACE
STAMP
HERE

Network World Unplugged Conference

DCI
204 Andover Street
Andover, MA 01810-5697

NetworkWorld UNPLUGGED

ALL NEW PROGRAM

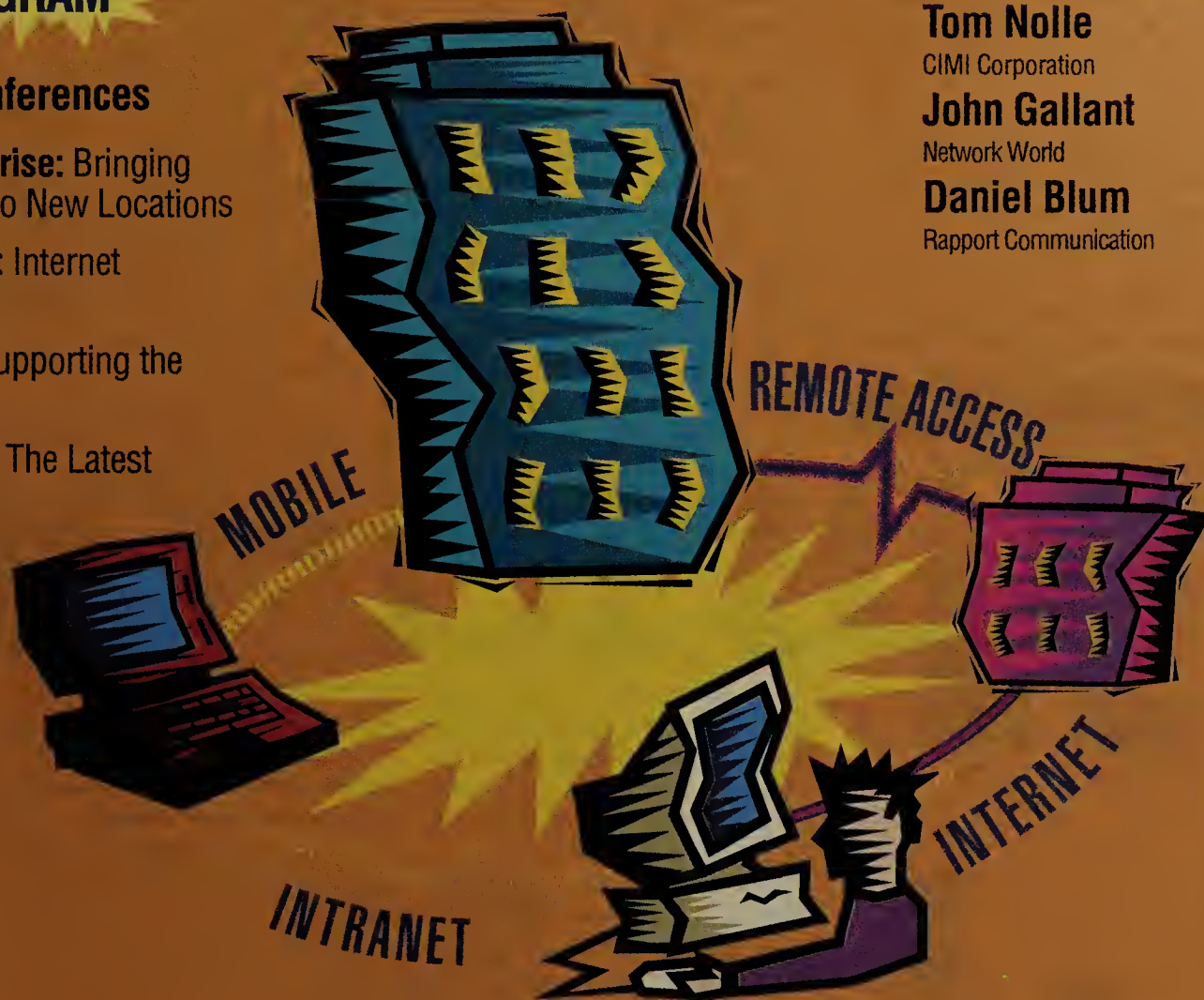
Four Focused Conferences

Extending the Enterprise: Bringing Corporate Networks to New Locations

Working on the Web: Internet & Intranet Strategies

Mobile Solutions: Supporting the Unplugged Worker

Issues and Answers: The Latest Technologies



SPECIAL PRESENTATIONS:

Tom Nolle

CIMI Corporation

John Gallant

Network World

Daniel Blum

Rapport Communication

Val Sribar

META Group

Christopher Calisi

Symantec Corporation

Gary Rowe

Rapport Communication

Jim Lindner

Attachmate

ESSENTIAL TOPICS COVERED

- Remote Site Connectivity
- Internet Tools & Strategies
- Networking Options
- Remote Database Access
- Security Issues
- Wireless Technologies
- ATM
- Intranet Strategies
- ISDN
- Telecommuting
- Frame Relay
- Management Support
- SOHO (Small Office, Home Office)
- And More!

Produced by

NetworkWorld



<http://www.DClexpo.com/>

See over 100 of the latest remote access, mobile, wireless and Internet technologies – all under one roof!

**SEPTEMBER 10-12, 1996
BOSTON, MASSACHUSETTS**

Co-Sponsored by



@Bell Atlantic NYNEX Mobile



EXTENDING THE CORPORATE NETWORK EVERYWHERE

CALL (508) 470-3880 FOR MORE INFORMATION AND A FREE BROCHURE!

NOS vendors vie for intranet dominance

IBM, Microsoft and Novell have ambitious plans to help users set up private Webs based on their server products.

By Christine Burns

In early June, Novell, Inc. shipped a slew of products for tying NetWare servers to the Web. Two weeks ago, Microsoft Corp. reemphasized its role in the intranet marketplace by hosting a daylong briefing that touched on nearly all its product lines. And just last week, IBM started talking about how it is going to survive as an intranet provider.

The top network operating system vendors are tripping over each other to position their

What users need from future Web servers is tighter ties to the underlying NOS's directory system, both for better management capabilities and the ability to tap into dynamic information contained on distributed databases.

Analysts agreed that, based on NetWare's proven speed as a file server, Novell's offering has an edge when it comes to delivering Web documents.

"Novell file servers scream. The ability to use that core technology to deliver Web content is

of survival for Novell and IBM.

"Novell and IBM have to find a way to contain the NT juggernaut. They must transform their NOSes into the best little Web engines out there," he said.

Novell's track

Novell has no intention of giving up its installed base as interest in intranets increases. Rather, the company has anchored its intranet strategy on the strong reputation of Novell Directory Services (NDS).

"We want users to leverage the investment they already have in NetWare," said Mark Griffiths, director of product marketing in Novell's Internet commerce division. "We see the intranet as your existing LAN, plus Web technology, plus anything enabled by the Internet."

Novell first hit the Web server market in December, when it rolled out NetWare Web Server 2.1. It features a set of NetWare Loadable Modules that run on a NetWare 4.1 server and comprises basic HTTP support for the delivery of HTML documents, some security through ties with NDS authentication and limited access controls.

The latest release of the NetWare Web Server, Version 2.5, was rolled out earlier this month. It gives end users the ability to search through an NDS directory via a Web browser and can serve up Java applets.

Running parallel with Novell's plans to make its Web server take more advantage of NDS is the company's intention to support the Lightweight Directory Access Protocol (LDAP) by September.

The IBM story

IBM's plans for its Web engine, the Internet Connection Server, center on its connection to the other server-based applications Big Blue offers.

Internet Connection Server was introduced in February, unassimilatingly enough, as one of

seven application servers. These IBM Software Servers — which comprise database, communication, directory and security, systems management, transaction and Notes servers — run on top of OS/2 Warp Server 4.0, AIX and Windows NT Server 3.51. Internet Connection Server includes HTML, HTTP and Common Gateway Interface support. It also provides proxy support in which the Web server acts as an agent for the browser to access remote

servers that are not directly accessible because of security restrictions. The IBM Web server can access HTML data stored on IBM DB2 and CICS machines via standard APIs.

Art Olbert, director of product plan management for IBM's personal software products, said interoperability between Internet Connection Server and other members of the IBM server suite will help the server survive amid stiff competition.

"When you run the suite on top of Warp Server, through a standard HTML browser, you can get at the file and print information of Warp Server, the database information from the Database Application Server, the transaction information from the transaction server and the Lotus Notes information through InterNotes," Olbert said. "It's all there."

In the future, users can expect IBM to play the same directory integration game as Novell. IBM is poised to roll out a directory and security server product later this summer based on the Open Software Foundation's Distributed Computing Environment (DCE).

Microsoft's Web world

Even though analysts have dubbed Windows NT Server the heir apparent to the Web server throne, the company has been

criticized for being slow on the intranet uptake. However, in the wake of its sweeping announcements two weeks ago, Microsoft is clearly ready to corner the intranet market by shipping an all-inclusive Web server in the Windows NT Server 4.0 box.

IIS is just a starting point for Microsoft, which introduced the product as a basic HTML document delivery engine in February.

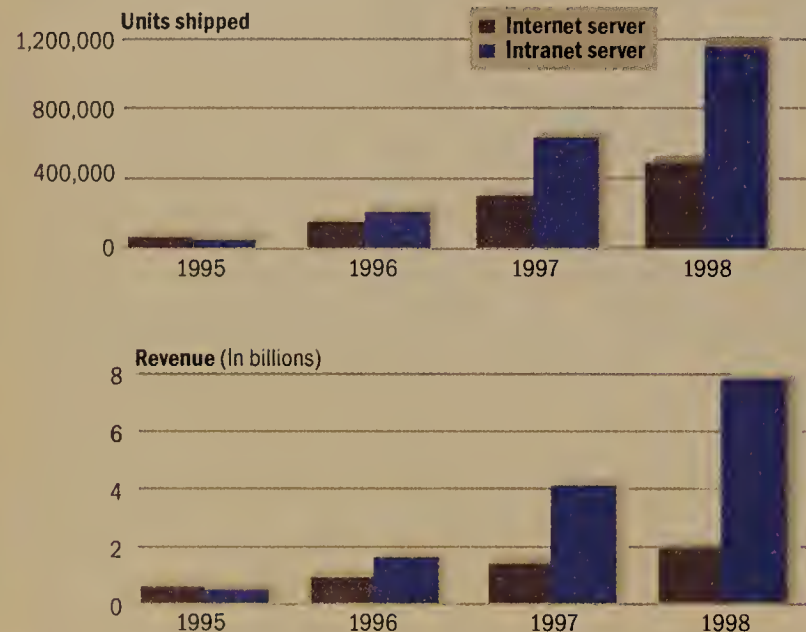
"People are attracted to the concept of the intranet because you can layer Web access technology on top of what you already have."

Art Olbert, IBM



Where the Web server market is going

Private intranet servers are expected to overtake public Internet servers this year based on units shipped and revenue.



SOURCE: ZONA RESEARCH, REDWOOD CITY, CALIF.

NOSes as easy-to-use and secure intranet servers with access to the public Internet, as well.

And why not? Just because Unix has been the operating system of choice to date for 'Net servers doesn't mean the same has to be true for intranet servers.

The market for intranets — corporate internal networks enhanced with Internet technologies — is set to explode (see graphic). And Novell, Microsoft and IBM are well positioned to pounce on that opportunity. As a group, their NOS products are already situated at the heart of most corporate networks.

Novell's Web Server, IBM's Internet Connection Server and Microsoft's Internet Information Server (IIS) can already transfer HTML documents across a corporate intranet.

a natural extension of NetWare," said Eric Brown, a senior analyst with Forrester Research, Inc. in Cambridge, Mass.

However, if you want strong Web server ties to dynamic information stored on distributed databases, Brown said Windows NT Server is the way to go.

"I am less interested in consuming flat HTML content than I am in connecting with more active environments. This ability to create application servers is what makes the Windows NT Server platform a better host for intranet content," Brown said.

Dave Cappuccio, vice president and research area director for network computing at Gartner Group, Inc. in Stamford, Conn., said molding NetWare and Warp Server to fit the Web server engine market is a matter

ary. In May, the company announced plans to upgrade its Web server and bundle it with every version of Windows NT Server 4.0 when it ships later this summer. Microsoft claims this Web server will be 40% faster than its predecessor.

For easier administration, IIS 2.0 includes support for Microsoft's Systems Management Server, as well as Simple Network Management Protocol tools. This version also includes access to Secure Sockets Layer security via a new Key Manager Tool, and includes support for Microsoft's Distributed Component Object Model, which allows application components to communicate securely via the 'Net.

The other shoe in Microsoft's plan to position Windows NT Server as an intranet server dropped two weeks ago when it announced Version 4.0 will be shipped with a search engine code-named Tripoli, its Front-Page 1.1 Web authoring tool, and a new Directory Server that supports LDAP and combines its existing domain name service and X.500.

"This integration is great for us because we already have Windows NT Server running all of our mission-critical applications," said David Kruglov, chief information officer at Data Track Systems, a Carlsbad, Calif.-based real estate research firm, which conducts business via the 'Net.

"While we looked at other Web servers, it just didn't make sense to go with another platform," he said. "Why go through the cost and the training hassles when we've got Microsoft all through our network?" ■

CHARLOTTE'S WEB SERVER
A future version of Novell's Web server, code-named Charlotte, will include electronic commerce capabilities; extended support for database APIs; and better security and management tools through further integration with NDS.

“Choosing the

right printers

used to be

a real

no-brainer

until my

network got

complicated.

Now I don't know

what to think.”

Think outside the box.

Introducing IBM® Network Printers.

Finally, printers designed from the ground up to function on your network. From a company that knows a thing or two about networking.



There's no need to adapt your network to our machines – it's supposed to be the other way around, isn't it? All four IBM Network Printers share open-standards, multiprotocol, multiplatform support. Giving you more connectivity options than any other workgroup printer.

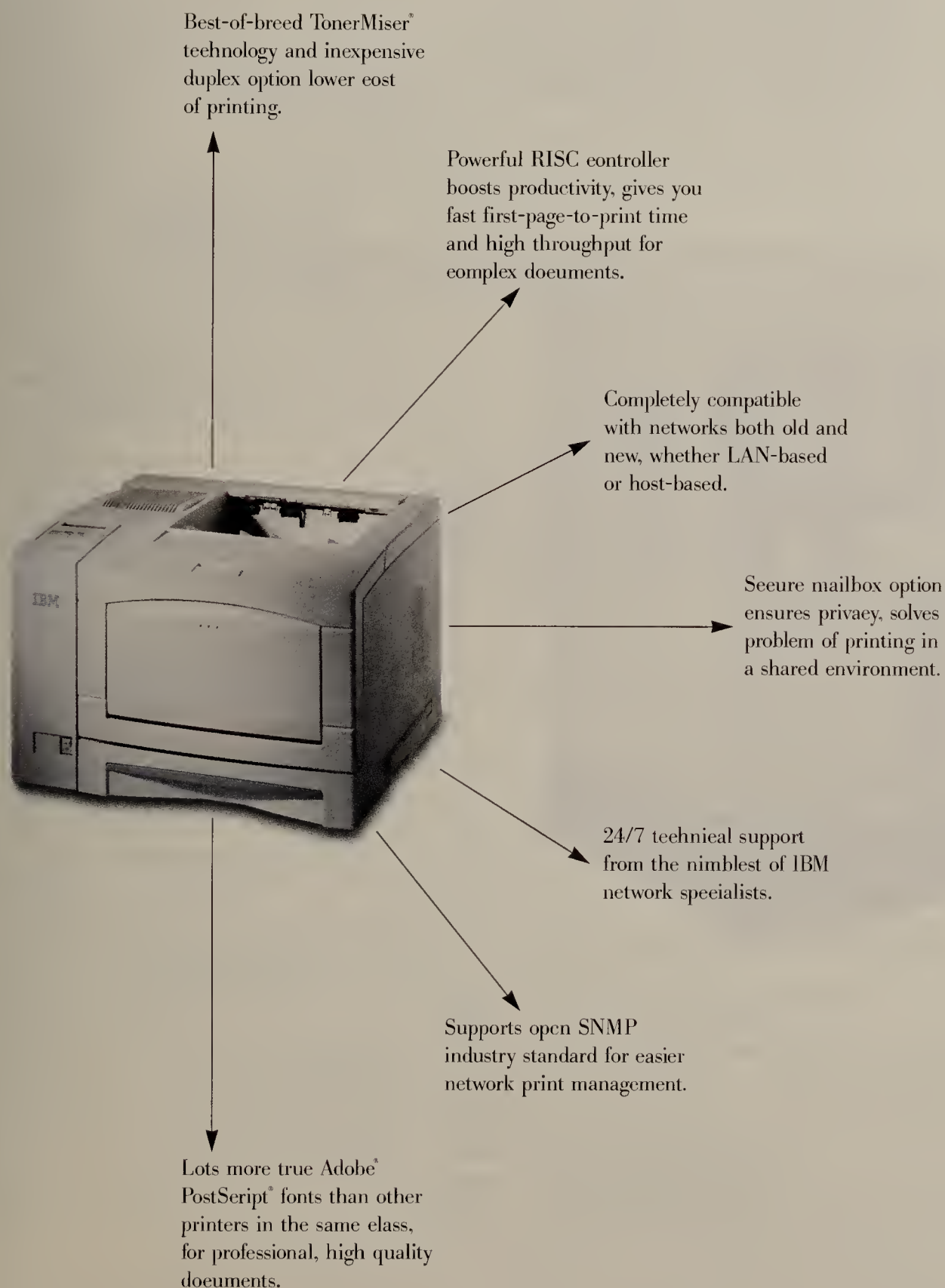


You also have more choices: three black and white models that can be customized to suit most any workgroup configuration, plus the IBM Network Color Printer to dazzle the most jaded of eyes. All at prices that fit very well, thank you, into your budget.

You may want to rethink your printing options. In the increasingly networked world, nothing is more useful than an open mind.



Call 1 800 IBM-2468, ext. JA225, for more information and for the IBM® Business Partner nearest you. Or drop by www.can.ibm.com/ibmprinters



Solutions for a small planet™



Everything you'd expect from a server running AIX.

Lock some or all of it up, with a three-position, three-level security locking door.

An LCD display gives you a heads up on the server even when you're running it headless.

Fast. Two built-in Fast/Wide SCSI-2 channels deliver internal data transfer speeds all the way up to 40MB per second.

Faster. The internal PCI bus moves bytes around at a quicker 132MB per second.

Fastest. As in 256MB per second. That's the speed you'll get out of the processor-to-second-level cache.

Apple Network Servers don't run any old UNIX® operating system. They run IBM's reliable, industrial-strength AIX® operating system.

Hot feature. Two rear cooling fans are hot-swappable.

With support for both TCP/IP and AppleTalk® protocols, you get fast network speed when you have either PCs or Macintosh® systems (or both) connected. Of course, being Apple, we couldn't resist tuning AppleTalk for maximum speed.

Add a PCI RAID disk array card, and your Network Server supports up to six hot-swappable drive bays. So your server doesn't have to go down just because one of your drives does.

With a modular processor daughtercard, upgrading the microprocessor in your Network Server is a snap.

Each major component of the Network Server 700 can be accessed in about the time it takes to read just a few of these captions—60 seconds or less.

Add up to six PCI cards—Ethernet, FastEthernet, PCI RAID disk array (only four of these, sorry), or a wide array of third-party PCI cards—in the six (count them, six) open slots.

You can easily add third-party memory DIMMs, SCSI disk drives and tape drives to our Network Servers. We won't, however, refuse your hard-earned money if you prefer genuine Apple® components.

Not that we're saying you'll ever need it, but an optional, 7-day-a-week, 24-hour-a-day service plan is available. To learn about priority queuing, next-day on-site service and more, simply contact your Apple Premium Server Reseller.

You want your server just to sit there and work. But that doesn't mean it has to be ugly. Enter Apple industrial and ergonomic design. It means our servers don't just look good, they're easy to move, upgrade and service, too.

Vocabulary test: Apple Network Servers are binary-compatible with >10³ proven AIX apps, no recompiling or porting necessary.

You get free, "try before you buy" software, too: Helios and IPT software for OPI publishing and file and print sharing, Legato Networker software for backup and recovery, and APC software for uninterruptible power supply support.

Is there any such thing as too much disk space? A great way to find out is to plug in a MegaDrive Systems' RAID array with its whopping one terabyte of storage.

With a rated WebStone 1.1 benchmark performance of 12 megabits per second, the Apple Network Server 700 makes any other server look like a benchwarmer. That's enough raw power to support eight T1 lines and millions of Internet connections a day.

Yes, there's a third, built-in, external SCSI port, perfect for adding up to seven more devices. Like the 20GB Digital Linear Tape (DLT) Drive from Quantum.

Start building the Network Server you need for under \$11,000.**

The mouse draws 10 mA. Pop quiz to follow.

Should it ever be necessary, replacing the logic board is as simple as unplugging the old one and plugging in the new.

Choose from two models, the Network Server 500 and the Network Server 700. As you'd expect, the Network Server 700 offers more speed and expandability.

Losing a power supply doesn't have to mean losing power. Twenty seconds is all it takes to replace either one of the two optional hot-swappable, redundant power supplies you get with the Network Server 700.



Apple
Premium
Server
Reseller

Even more information is available! Call 800-503-3855 to receive a list of Apple Premium Server Resellers plus detailed product information by fax, or surf your way on over to www.solutions.apple.com/netserver.

Except this.



Client/Server Applications

Covering: Databases • Messaging • Groupware
Conferencing • Imaging • Multimedia • Development

Briefs

■ **Allen Systems Group, Inc.** has released *WebGalaxy*, a rapid development tool set that generates **Java applications**. The graphical development environment lets users drag and drop information into *WebGalaxy*, which then generates the needed Java, HTML and SQL code. The development license is free; the deployment license ranges from \$5,000 to \$30,000 for each server on which the application will run.

Allen Systems: (800) 475-7171.

■ **Platinum Technology, Inc.** of Oakbrook Terrace, Ill., has released new versions of two key **data analysis tools**. *Info-Beacon 3.1* consists of a multidimensional database and tools for analyzing large data sets. The new release supports all major relational databases and a host of third-party products. It is available on Windows NT now and will be available on Unix in the fall. Pricing starts at \$45,000 for a 10-user license.

Platinum also released Version 4.0 of *Forest & Trees*, a desktop program for accessing and analyzing data in an array of data sources. The new version has a redesigned graphical user interface, a point-and-click query builder, a new program to build interactive 3-D graphics from data, and a new feature that lets MIS developers quickly build and customize applications for end users.

Pricing is \$795 per user; the administrative version is \$995. Platinum: (708) 620-5000.

■ **IBM** has released three new database extenders for **DB2**. The extenders support different complex media types: video, audio and images. The multimedia extenders are for DB2 on AIX, OS/2 and Windows NT. They are part of a development tool kit priced at \$495.



Workflow hot streak cools off

Sales of stand-alone products slow as users graduate to integrated offerings.

By Barb Cole
Boston

After years of explosive growth, the workflow software market has hit a plateau.

According to a recent report, published by Delphi Consulting Group, Inc. based here, the market grew by about 13% in 1995,

environment, which makes it easier to deploy workflow applications, he said.

Some of the more successful workflow vendors have responded to the market shifts by broadening their offerings to include Web-based workflow and document management

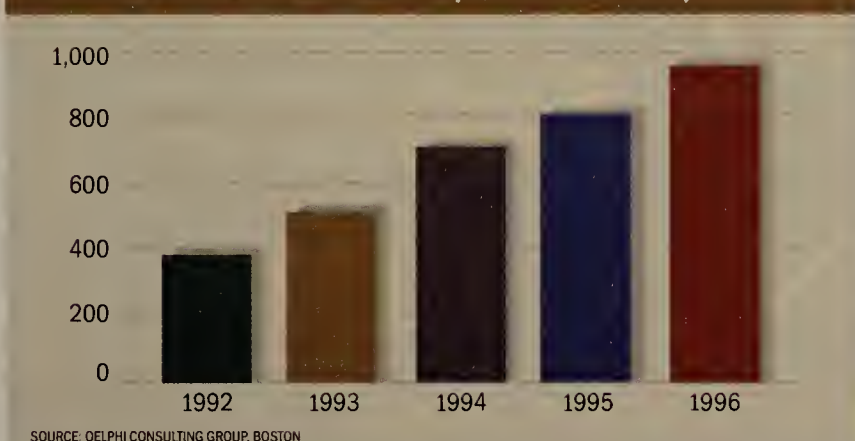
to its stable last year.

The report also found that companies are looking to expand workflow applications beyond the department level to cover the enterprise.

But buying decisions are taking longer, since companies need to go through the process of evaluating how workflow products will fit in with existing software architecture.

"We'll move to a full-featured workflow product, but we're not there yet," said Beth Magner, systems analyst at Union Central Life Insurance Co. in Cincinnati. The company is building a workflow application that will initially

Worldwide workflow software revenue (in millions of dollars)



down considerably from the 30% to 40% growth rates for the previous three years.

The slowdown in sales is partly because companies are increasingly implementing the workflow technology found in their mainstream development tools, packaged applications and groupware products rather than buying pure workflow products, said Tom Koulopoulos, Delphi's president. Everyone from SAP AG to Dun & Bradstreet Software has some workflow features in their products, Koulopoulos said. Although these products do not offer the same level of functionality as traditional workflow systems, "they are having an impact on the market," he said.

In addition, groupware systems are increasingly being viewed as platforms for workflow applications. "Consistently, our clients want to implement workflow within a Lotus [Development Corp. Notes] environment," said Todd Hunter, president of Workflow Designs, Inc., a Dallas-based consultancy that builds custom workflow systems.

Companies are eyeing Notes as the focal point for workflow applications because it includes a repository for data and forms, and has built-in messaging, Hunter said. Notes is also designed to run in a distributed

and imaging capabilities. FileNet Corp., which grew by more than 30% in 1995, added the Saros Corp. document management system and Watermark Software, Inc. imaging software

Worldtalk chats up E-mail security management

By Barb Cole

Santa Clara, Calif.

Worldtalk Corp. last week took the wraps off new software for centrally managing electronic messaging backbones and adding security to electronic mail traffic sent over the Internet.

The software consists of two add-on modules for Worldtalk's NetJunction network application router, which connects disparate messaging systems such as Microsoft Corp.'s Exchange, Lotus Development Corp.'s Notes, Hewlett-Packard Co.'s OpenMail and Novell, Inc.'s GroupWise.

The first module, dubbed Advanced Management Service, consists of Simple Network Management Protocol agents that run on HP servers, plus a graphi-

See Worldtalk, page 41

be used by about 60 workers to automate an insurance claim processing application.

"When we get to the point where we want to add imaging capabilities and roll out to a larger number of users, we'll decide on a workflow system," she said. ■

Get more info on Network World Fusion, including:

- A workflow primer
- A workflow glossary
- A database of workflow vendors

Select News+ then Client/Server Applications.

NetworkWorld
Fusion
<http://www.nwfusion.com>

Development tool kits link the Web with back-end data

OEC does Mambo, HAHT software points to HAHTsite.

By John Cox

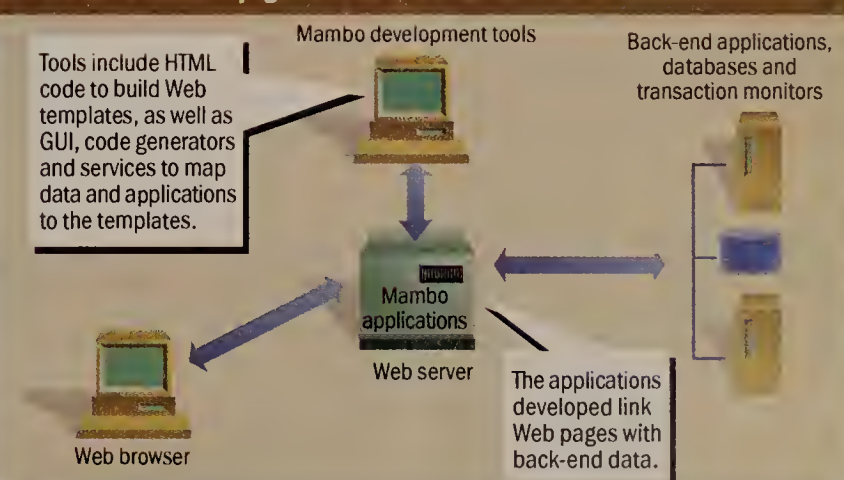
Open Environment Corp. (OEC) and HAHT Software, Inc. have both introduced application development tools designed to marry Web pages with back-end corporate applications and data.

OEC's Mambo offering lets

Mambo incorporate HoT-Metal Pro 3.0 from SoftQuad, Inc. for building HTML pages and templates.

Mambo uses the standard Common Gateway Interface (CGI) to give the Web server access to corporate applications and data.

Mambo marries Web pages and back-end data



developers graphically lay out a Web application, and then generates all the needed server code to bridge an HTTP-based Web server and corporate applications, databases and transaction monitors. The server-based software runs on three brands of Unix and soon will run on Windows NT.

But OEC's engineers surmounted the performance limitations of CGI by using efficiently compiled C code and by limiting the work actually done by the CGI.

Mambo is available now at \$2,495 per developer and \$500 per server.

See Tools, page 41

FRAME RELAY ENABLING COST-EFFICIENT TRANSMISSION OF DATA FILES

VOICE. DATA. VIDEO. CONNECTED.

ISDN HIGH SPEED LINES

SNET ENTERPRISE SOLUTIONS

In today's communications, it's not "where?" It's "how?" And because whatever type of connections you make, you have to be certain that they're reliable, it's essential that your carrier is a partner you can depend on.

For over 100 years, SNET has provided the highest level of reliable telecommunications service to Connecticut businesses. Let us show you the ways that we can make Frame Relay and ATM... fiber optics and ISDN... even statewide Internet... work for you.

You've been moving forward. So have we. Let's continue our connection. Voice. Data. Video.

SNET
We go beyond the call

☐ **Yes!** I want my **FREE** subscription to *NetworkWorld*.

☐ No. Thank You.



Signature _____ Date _____

To qualify: You must supply your company name and address.

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Business phone (_____) _____

Business FAX (_____) _____

Internet address _____

If there is a parent company, please provide name and address:

Street Address _____ City _____ State _____ Zip _____

1

Industry: (check one only)

- | | |
|---|--|
| 01. ☐ Manufacturers (other) | 12. ☐ Government (Federal/State/Local) |
| 02. ☐ Finance/Banking | 13. ☐ Military |
| 03. ☐ Insurance/Real Estate/Legal | 14. ☐ Aerospace |
| 04. ☐ Health Care Services | 15. ☐ Consultants (Independent) |
| 05. ☐ Hospitality/Entertainment/Recreation | 16. ☐ Carriers/Interconnects |
| 06. ☐ Media/TV/Cable/Radio/Print | 17. ☐ Manufacturers (Computer/Communications) |
| 07. ☐ Retail/Wholesale Trade/Business Services | 18. ☐ Resellers of Computer/Network Products (VARs, VADs) |
| 08. ☐ Transportation | 19. ☐ Systems/Network Integrators |
| 09. ☐ Utilities | 20. ☐ Distributors (Computer/Communications) |
| 10. ☐ Education | 21. ☐ Other (please specify) _____ |
| 11. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry) | |

2

What is your job function? (check one only)

NETWORK IS MANAGEMENT:

- | | |
|---|--|
| 1. ☐ Networking Management | 6. ☐ Corporate Management (CIO, CEO, Pres., VP, Dir., Mgr., Financial Management) |
| 2. ☐ LAN Management | 7. ☐ Consultant (Independent) |
| 3. ☐ Datacom/Telecom Management | 8. ☐ Other (please specify) _____ |
| 4. ☐ IS, IT, MIS, Systems Management | |
| 5. ☐ Engineering Management | |

3

What is the total number of sites for which you have purchase influence? (check one only)

- | | | | |
|-------------------------------------|-------------------------------------|-----------------------------------|----------------------------------|
| 1. ☐ 100+ | 3. ☐ 20 - 49 | 5. ☐ 2 - 9 | 7. ☐ None |
| 2. ☐ 50 - 99 | 4. ☐ 10 - 19 | 6. ☐ 1 | |

4

What is your scope and involvement in purchasing decisions for network products & services for your enterprise?

A. SCOPE (check one only)

1. ☐ Corporate/Enterprise
2. ☐ Department
3. ☐ None

B. INVOLVEMENT (check all that apply)

1. ☐ Recommend/Specify
2. ☐ Approve
3. ☐ Evaluate
4. ☐ Determine the need
5. ☐ None

5

Check ALL that apply in Columns A and B:

A. I am involved in the purchase of the following products/services:

B. I plan to purchase the following products/services:

- | | |
|--|---|
| A 100 B LOCAL-AREA NETWORKS | ☐ 49. ☐ Intranet Applications/Groupware |
| ☐ 01. ☐ Local-Area Networks | ☐ 50. ☐ Search Retrieval Products (web crawler) |
| ☐ 02. ☐ Network Op. Sys. Software | ☐ 51. ☐ Internet Development Tools |
| ☐ 03. ☐ LAN Storage/Backup | ☐ 52. ☐ Internet Commerce Tools |
| ☐ 04. ☐ Optical LAN Storage/Backup | A 105 B SOFTWARE/APPLICATIONS |
| ☐ 05. ☐ Disk LAN Storage/Backup | ☐ 53. ☐ Network Management |
| ☐ 06. ☐ Tape LAN Storage/Backup | ☐ 54. ☐ Systems Management |
| ☐ 07. ☐ RAID LAN Storage/Backup | ☐ 55. ☐ Security |
| ☐ 08. ☐ Network Test/Diagnostic Tools | ☐ 56. ☐ Communications Software |
| ☐ 09. ☐ Cables, Connectors, Baluns | ☐ 57. ☐ Terminal Emulation |
| ☐ 10. ☐ UPS | ☐ 58. ☐ Word Processing |
| ☐ 11. ☐ Network Interface Cards | ☐ 59. ☐ Operating Systems |
| ☐ 12. ☐ Peer-to-Peer LANs | ☐ 60. ☐ Client/Server Applications Development |
| ☐ 13. ☐ SNMP Network Management | ☐ 61. ☐ Database Management/RDBMS |
| ☐ 14. ☐ ATM Switches | ☐ 62. ☐ Spreadsheet |
| ☐ 15. ☐ Token-Ring Switches | ☐ 63. ☐ Groupware |
| ☐ 16. ☐ Ethernet Switches | ☐ 64. ☐ EDI |
| ☐ 17. ☐ Remote LAN Access/Communications Servers | ☐ 65. ☐ E-mail |
| ☐ 18. ☐ Superservers | ☐ 66. ☐ Windows/Graphical User Interface |
| ☐ 19. ☐ File/Application Servers | ☐ 67. ☐ Multimedia |
| ☐ 20. ☐ Print Servers/Fax Servers | ☐ 68. ☐ Graphics/DTP |
| ☐ 21. ☐ CD-ROM Servers | ☐ 69. ☐ Remote Access |
| ☐ 22. ☐ LAN Servers | ☐ 70. ☐ Imaging |
| | ☐ 71. ☐ Server Suites (Backoffice, etc.) |
| | ☐ 72. ☐ Suites |
| | ☐ 73. ☐ Middleware |
| | ☐ 74. ☐ Document Management |
| | ☐ 75. ☐ Database Server |
| | ☐ 76. ☐ Site Metering Tools |
| | ☐ 77. ☐ Computer-Integrated Telephony (CIT) |

A 101 B INTERNETWORKING

- ☐ 23. ☐ Bridges
☐ 24. ☐ Routers
☐ 25. ☐ Bridge/Router
☐ 26. ☐ Gateways
☐ 27. ☐ Intelligent Hubs
☐ 28. ☐ Stackable Hubs

A 102 B COMPUTERS/PERIPHERALS

- ☐ 29. ☐ Laptops/Notebooks/Sub-Notebooks
☐ 30. ☐ Micros/PCs
☐ 31. ☐ Minis
☐ 32. ☐ Mainframes
☐ 33. ☐ Workstations
☐ 34. ☐ Terminals
☐ 35. ☐ Printers/Network Printers
☐ 36. ☐ Cluster Controllers
☐ 37. ☐ CD-ROM
☐ 38. ☐ Fax/Modem Boards

A 103 B REMOTE/WIRELESS COMPUTING

- ☐ 39. ☐ PDAs
☐ 40. ☐ PCMCIA Devices
☐ 41. ☐ Wireless Data Services
☐ 42. ☐ Wireless Data Equipment
☐ 43. ☐ Wireless LANs
☐ 44. ☐ Cellular Equipment & Services

A 104 B INTERNET/INTRANET

- ☐ 45. ☐ Internet Access Service
☐ 46. ☐ Firewalls/Security
☐ 47. ☐ Web Servers
☐ 48. ☐ Web Browsers

A 106 B WIDE-AREA NETWORK EQUIPMENT & SERVICES

- ☐ 78. ☐ Frame Relay Equip./Services
☐ 79. ☐ Modems
☐ 80. ☐ FT-1/T-1/T-3 Multiplexers
☐ 81. ☐ FT-1/T-1/T-3 Services
☐ 82. ☐ SONET
☐ 83. ☐ Inverse Multiplexers
☐ 84. ☐ SMDS
☐ 85. ☐ Asynchronous Transfer Mode
☐ 86. ☐ Diagnostic/Test Equipment
☐ 87. ☐ DSU/CSU
☐ 88. ☐ VSAT/Satellite
☐ 89. ☐ ISDN Equipment & Services
☐ 90. ☐ PBXs
☐ 91. ☐ Voice Mail/Response
☐ 92. ☐ Videoconferencing
☐ 93. ☐ Leased Lines
☐ 94. ☐ Switched Data
☐ 95. ☐ E-mail
☐ 96. ☐ 800/900/MTS Services
☐ 97. ☐ Virtual Networks
☐ 98. ☐ Outsourcing/Systems Integration Services
☐ 99. ☐ Education/Training Services

☐ 107 ☐ None of the above (1-99)

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

☐ My home address is also my business address.

Optional delivery address:

Enter your home address below if your company will not accept delivery at your business address:

Street address _____ City _____ State _____ Zip _____

If military, please specify branch and base: _____

If government, please specify division: _____

Do you wish to receive Intranet Magazine? ☐ Yes ☐ No

Publisher reserves the right to serve only those individuals who meet publication qualifications. Incomplete forms will not be processed.

9601

6

What is the total number of LANs, workstations/nodes at this location/ in your organization?

At this location:

LANs

1. ☐ 5,000+
2. ☐ 1,000 - 4,999
3. ☐ 100 - 999
4. ☐ 50 - 99
5. ☐ 10 - 49
6. ☐ 1 - 9

Workstations/Nodes

- ☐
☐
☐
☐
☐
☐

Entire organization:

LANs

1. ☐ 5,000+
2. ☐ 1,000 - 4,999
3. ☐ 100 - 999
4. ☐ 50 - 99
5. ☐ 10 - 49
6. ☐ 1 - 9

Workstations/Nodes

- ☐
☐
☐
☐
☐
☐

7

Check ALL that apply in Columns A and B:

A. The following network platforms are currently installed:

B. The following network platforms are planned for purchase:

A 88 B NETWORK PROTOCOLS

- ☐ 01. ☐ SNA
☐ 02. ☐ DECnet
☐ 03. ☐ TCP/IP
☐ 04. ☐ Novell IPX/SPX
☐ 05. ☐ APPC/APPN/LU 6.2
☐ 06. ☐ NETBIOS
☐ 07. ☐ AppleTalk
☐ 08. ☐ NFS
☐ 09. ☐ IPv6
☐ 10. ☐ SNMP/SNMPv2
☐ 11. ☐ Other (please specify) _____

A 87 B LAN ENVIRONMENT

- ☐ 24. ☐ 4M Token Ring
☐ 25. ☐ 16M Token Ring
☐ 26. ☐ Ethernet
☐ 27. ☐ Fast Ethernet
☐ 28. ☐ 100vg Any LAN
☐ 29. ☐ FDDI
☐ 30. ☐ LocalTalk
☐ 31. ☐ 10Base-T
☐ 32. ☐ ATM
☐ 33. ☐ Other (please specify) _____

A 86 B NETWORK OPERATING SYSTEM

- ☐ 12. ☐ Microsoft (LAN Manager)
☐ 13. ☐ Novell (NetWare 2.X, 3.X)
☐ 14. ☐ Novell (NetWare 4.X)
☐ 15. ☐ Windows NT
☐ 16. ☐ Windows NT/Advanced Server
☐ 17. ☐ LocalTalk (AppleTalk)
☐ 18. ☐ Banyan (VINES)
☐ 19. ☐ IBM (LAN Server)
☐ 20. ☐ IBM (PC LAN Program)
☐ 21. ☐ Artisoft (LANtastic)
☐ 22. ☐ Digital (Pathworks)
☐ 23. ☐ Other (please specify) _____

A 88 B COMPUTER OPERATING SYSTEM

- ☐ 34. ☐ DOS
☐ 35. ☐ Unix/Xenix/AIX
☐ 36. ☐ OS/2
☐ 37. ☐ OS/2 Warp
☐ 38. ☐ IBM MVS
☐ 39. ☐ IBM VM
☐ 40. ☐ Digital VMS
☐ 41. ☐ Macintosh
☐ 42. ☐ Windows
☐ 43. ☐ Windows 95
☐ 44. ☐ NT
☐ 45. ☐ Solaris
☐ 46. ☐ Other (please specify) _____

☐ 47. ☐ None of the above (1-46)

8

For which areas outside of North America do you have purchase influence? (check all that apply)

- | | | |
|------------------------------------|---|---|
| 1. ☐ Europe | 3. ☐ South America | 5. ☐ Middle East |
| 2. ☐ Asia | 4. ☐ Australia | 6. ☐ None |

9

Please indicate your involvement in developing/implementing Internet/ Intranet Technologies: (check all that apply)

- | | | |
|--|---------------------------------------|--------------------------------------|
| 1. ☐ Recommend/Specify | 2. ☐ Approve | 3. ☐ Evaluate |
| 4. ☐ Determine the need | 5. ☐ Implement | 6. ☐ None |

10

Which of the following hardware platforms are installed/planned in your company? (check all that apply)

- | | | | |
|-----------------|--------------------------|--------------------------|--------------------------|
| | Mainframes | | Minis |
| | A - Installed | B - Planned | C - Installed |
| 1. IBM | ☐ | ☐ | ☐ |
| 2. Amdahl | ☐ | ☐ | ☐ |
| 3. Cray | ☐ | ☐ | ☐ |
| 4. Hitachi | ☐ | ☐ | ☐ |
| 5. Unisys | ☐ | ☐ | ☐ |
| | D - Planned | | |
| 1. IBM | ☐ | ☐ | ☐ |
| 2. Digital | ☐ | ☐ | ☐ |
| 3. Tandem | ☐ | ☐ | ☐ |
| 4. Unisys | ☐ | ☐ | ☐ |
| 5. AT&T GIS | ☐ | ☐ | ☐ |
| 6. HP | ☐ | ☐ | ☐ |
| 7. Data General | ☐ | ☐ | ☐ |

What is the total number of Servers/Clients installed/planned: (USE NUMBERS ONLY)

E-AT THIS LOCATION

#	F-% with Internet Access
1. Servers	%
2. Clients	%

G-ENTIRE ORGANIZATION

#	H-% with Internet Access
1. Servers	%
2. Clients	%

Which of the following Servers/Clients do you have installed/planned: (CHECK ALL THAT APPLY)

	At this location:	Entire organization:
	I. Servers	J. Clients
01. Power PC	☐	☐
02. Power Mac	☐	☐
03. Mac Other	☐	☐
04. Multi Processor Servers	☐	☐
05. P6	☐	☐
06. Pentium Pro	☐	☐
07. Pentium	☐	☐
08. 486	☐	☐
09. 386	☐	☐
10. 286	☐	☐
11. Rise	☐	☐
12. Other	☐	☐

11

What is the estimated value of networking equipment and services that you help specify, recommend or approve annually? (check one only)

- | | | |
|--|--|--|
| 01. ☐ \$100 million or more | 05. ☐ \$10 million - \$19.9 million | 09. ☐ \$250,000 - \$499,999 |
| 02. ☐ \$50 million - \$99.9 million | 06. ☐ \$5 million - \$9.9 million | 10. ☐ \$249,999 or less |
| 03. ☐ \$25 million - \$49.9 million | 07. ☐ \$1 million - \$4.9 million | 11. ☐ None of the above |
| 04. ☐ \$20 million - \$24.9 million | 08. ☐ \$500,000 - \$999,999 | |

12

Estimated gross annual revenue of your entire company/institution: (check one only)

- | | | |
|--|--|--|
| 1. ☐ \$10 billion or more | 4. ☐ \$100 million to \$499.9 million | 7. ☐ \$5 million to \$9.9 million |
| 2. ☐ \$1 billion to \$9.9 billion | 5. ☐ \$50 million to \$99.9 million | 8. ☐ \$4.9 million or less |
| 3. ☐ \$500 million to \$999.9 million | 6. ☐ \$10 million to \$49.9 million | 9. ☐ None of the above |

13

Estimated number of employees at this location/in entire organization:

- | | |
|---|---|
| At this location: | Entire organization: |
| 1. ☐ Over 10,000 | 1. ☐ Over 10,000 |
| 2. ☐ 5,000 - 9,999 | 2. ☐ 5,000 - 9,999 |
| 3. ☐ 2,500 - 4,999 | 3. ☐ 2,500 - 4,999 |
| 4. ☐ 1,000 - 2,499 | 4. ☐ 1,000 - 2,499 |
| 5. ☐ 500 - 999 | 5. ☐ 500 - 999 |
| 6. ☐ 499 or less | 6. ☐ 499 or less |

1. FOLD HERE & MAIL TODAY



3. PLEASE TAPE HERE

2. FOLD HERE & MAIL TODAY



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO 1752 NORTHBROOK IL

POSTAGE WILL BE PAID BY ADDRESSEE

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

PO BOX 3091

NORTHBROOK IL 60065-9928

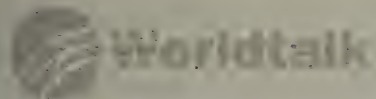


Worldtalk

Continued from page 39

cal administration tool for Windows NT called NetOps.

The software may be used to centrally monitor E-mail statistics, directories and message queues across mail backbones. Specifically, administrators may track events such as the number of messages per hour and the number of nondelivery notifications, according to Simon Khalaf, director of product marketing at Worldtalk.



Company: WorldTalk Corp.

Headquarters: Santa Clara, Calif.

Founded: 1992

Employees: 85

Financials: Went public in April; revenues were \$2.7 million in the first quarter of 1996

Primary product: NetJunction, for connecting LAN-based E-mail systems to host-based ones

Key competitors: IBM, Control Data Systems

Advanced Management Services is also integrated with the HP OpenView net management platform, according to Khalaf.

Available now, the server agent software costs \$9,950, while NetOps costs \$2,500.

The second add-on, Internet Messaging Security Service, lets mail administra-

BusinessBriefs

Workflow software maker **Action Technologies, Inc.** last week announced that Sandia National Laboratories will use its Metro Web-enabled workflow software to automate a travel application supporting more than 600 users in California and New Mexico. The application is expected to reduce the cycle time for a four-signature approval process from two weeks to four days. Down the road, Sandia plans to deploy Metro applications across its 8,000-seat intranet, which is based on Netscape Communications Corp. client and server software.

NetManage, Inc. has acquired Zmail electronic mail from **Network Computing Devices, Inc.** NetManage will release software by year-end that combines Zmail and JetMail, NetManage's recently released Internet E-mail software. Also, NetManage will offer Zmail 4.01 as an option in its Chameleon suite of TCP/IP applications.

Crystal Services, a wholly owned subsidiary of **Seagate Technology, Inc.** and a maker of database query tools, has changed its name to Seagate Software Information Management Group. The company plans to expand its range of software to include a line of online analytical processing products.

tors block users from sending or receiving Internet messages.

The software may be used to block entire messages or just attachments within messages. It is available now for \$9,950.

The introduction of this module is part of a broad push by Worldtalk to add Internet mail products to its stable, according to Khalaf.

© Worldtalk: (408) 567-1500.

Tools

Continued from page 39

Separately, HAHT Software last week unveiled HAHTSite, a set of graphical tools that let developers lay out Web pages. When a browser user presses a button or fills in a field on an HTML page, these instructions interact with the HAHTSite Engine, a multithreaded server program that maintains a persis-

tent connection and coordinates access to an array of back-end servers.

HAHTSite runs on Windows 95 or Windows NT and will be available this month in two versions priced at \$695 (for basic Web authoring) and \$995. The HAHTSite Engine runs on Windows 95, Windows NT, Solaris, HP-UX and AIX. It is priced at \$2,495 per server CPU.

© OEC: (800) 562-5969; HAHT: (800) 996-3222.

NetworkWorld

TECHNICAL SEMINARS

"IP is becoming the common coin of enterprise networking and understanding where IP is going is a high priority for network professionals."
John Gallant, Editor-in-Chief, Network World

DIRECTED AND PRESENTED BY RENOWNED INTERNETWORKING EXPERT MARK MILLER

Preparing for the Next Generation Internet Protocol

The next generation of Internet Protocol — IPv6 will significantly impact your TCP/IP-based inter-network. The Internet explosion now requires new functions that go beyond the capabilities of the current Internet Protocol, or IP. These include enhanced security, support for real time traffic flows and expanded addressing capabilities. The addressing issue has been one of the most significant concerns as it was predicted that the Internet community would run out of available addresses, thus limiting the growth of this critical communication resource.

In late 1990, the Internet Engineering Task Force (IETF) initiated efforts to select a successor to the IP. In late 1993, the IETF formed the Internet Protocol — Next Generation (IPng) working group, which was chartered with investigating the various proposals, and recommending a course of action. The outcome of those efforts produced what is now known as IP version 6 (IPv6), which is currently being implemented by many vendors.

Perhaps more importantly, IP is the foundation of the TCP/IP protocol suite. Therefore if IP is revised, other protocols must be changed as well. The significance of this protocol revision extends to LANs, MAN and WAN transmission systems, as well as the upper layer protocols and application programming interfaces.

Whether you are a network manager, designer or software developer, this seminar will provide you with information on the widespread ramifications of this new protocol. You will learn how to effectively plan and implement a successful, orderly transition.

THE NEXT GENERATION FOR TCP/IP INTERNETWORKS

KEY BENEFITS OF ATTENDING

- Understand the limitations of the current Internet Protocol — IPv4
- Learn details of the proposed IPng solutions: CATNIP, TUBA and SIPP
- Understand the key functional and protocol enhancements incorporated into IPv6
- Analyze the formats of the IPv6 packet header, extension headers, ICMPv6 messages, Neighbor Discovery messages and others
- Gain detailed insights into how the IPv6 transition will affect other protocols, such as Ethernet, token ring, RIP and OSPF
- Explore the effects of IPv6 on other elements of your internet or intranet architecture
- Learn how leading vendors such as Bay Networks, Cisco Systems, Digital, FTP Software, Sun and others are implementing IPv6
- Discover how to obtain public domain sources of further information on IPv6

TOPICS YOU DON'T WANT TO MISS!

- ✓ Learn how the implementation of IPv6 will allow continued expansion of the global Internet
- ✓ Discover key features of IPv6, including larger addresses and security
- ✓ Learn how to strategically plan your transition from IPv4 to IPv6

1996 LOCATIONS AND DATES

Chicago, IL	September 26	Boston, MA	November 8
Washington, DC	October 10	Irvine, CA	December 3
Denver, CO	October 16	San Francisco, CA	December 4
Atlanta, GA	October 24	New York, NY	December 10
Dallas, TX	October 25	Philadelphia, PA	December 11

REGISTER AND YOU WILL RECEIVE . . .

- Comprehensive Seminar Workbook
- CD containing over 1,000 Internet RFC, FYI and STD reference documents
- Copy of *Troubleshooting TCP/IP*, 2nd Edition, by Mark A. Miller, P.E.
- Luncheon and break refreshments
- Exclusive Protocol Reference Guides: TCP/IP, IPv6 and OSPF
- All of the above included in your \$450 registration fee

Note: If you can't attend, a full attendee kit is available for just \$99.95!

Web/E-Mail Information

Obtain full seminar information and register on-line in the Professional Development Group section on our Web site at www.nwffusion.com

OR

receive full seminar information via e-mail by sending a request to: seminars@nwffusion.com

Please put the word "IP" in the subject field.

Call 1-800-643-4668

Register today for the seminar nearest you!

Dial Our FAX-BACK Information Line at 1-800-756-9430

for a complete seminar outline and registration form.

When prompted, request document #60.

SHARED LOGIC

The messaging industry's price war

A price war in the messaging and groupware market is giving companies a chance to buy into the latest technology at a low price, and this is one gift horse you should look in the mouth.

The price war, if you hadn't noticed, was touched off at the end of 1995. That's when Lotus Development Corp. announced that Notes Mail for Notes Release 4 would sell for \$55 and Desktop Notes would sell for \$69.

Microsoft Corp. soon followed suit, announcing competitive prices for its new Exchange product. Not to be outdone, Novell, Inc. slashed the price of its Group-Wise 4.1 product.

The result? A marketing manager working for yet another major vendor complained, "For some large accounts, we're being driven down to \$25 or \$30 per client, and that includes both the mailbox activation charge and the client software

itself." While the vendor's messaging software retails for over \$50 in quantities of 50 end users or more, the price can go much lower when the product is sold in larger volumes.

While this vendor can sometimes get another \$25 for calendaring, this opportunity may soon disappear. To a great extent, basic messaging and groupware—which Rapport defines as a set of software consisting of electronic mail, group scheduling, discussion databases, document sharing, forms and simple workflow—are converging into a single product.

However, basic messaging/groupware tools don't yet include all possible groupware features. Over time, you'll need to add helper applications and support evolving object models, complex production workflow, real-time conferencing and sophisticated application development capabilities. You must make sure that your messaging/groupware foundation will support these and other additions.

Also, keep in mind that the client sticker price is not the most important decision factor in a messaging



buy, since there are also ongoing cost issues. This is especially true within large enterprises, where the real cost drivers are administering the messaging system and maintaining system integrity.

Rapport estimates that the annual per-user cost of ownership among the top next-generation client/server messaging platforms will range from about \$50 to \$500 or more. The price depends on which product is selected and on how it is deployed.

Small to midsize enterprise users don't need to worry about the ongoing cost issues quite so much. But price wars can cause plenty of other showstoppers as vendors look to trim expenses.

For instance, when you have a problem with a package, will a human being at the vendor's support organization answer the phone before you give up? Will the vendor even have an 800 number?

There also may be incessant upgrade costs and migration headaches as revenue-hungry vendors shuffle existing features around and gratuitously change file formats in frequent new releases that basically lack any real value. Even when upgrades are provided free, the six-month or shorter release cycle that many vendors have adopted can lead to quality and performance problems.

Will the price war eventually drive messaging/groupware clients to \$15, \$10 or \$5 per seat?

"I hope not," said Greg Lobdell, Microsoft's Exchange product manager.

I agree. There is a definite dark side to price wars.

Blum is a principal at Rapport Communication, a consultancy that focuses on messaging, groupware and electronic commerce. He can be reached at dblum@interramp.com.

**TO SELECT
THE BEST
BANDWIDTH,
YOU NEED
THE RIGHT
TOOLS.**

Not since the '60s British invasion has anyone sent a message to the world as powerfully as Dynatech. Or as versatily.

It's a new age. And messages are traveling at a range of speeds and resolutions unheard of even a decade ago.

❖ Dynatech's DynaStar™ Portfolio scales each communication to meet its specific needs. Saving you big money. And changing the world of networking to a place of far greater peace and harmony.

❖ Next time you want to connect with the world, do it with the most powerful tools at your fingertips. Instruments that make the shifts across platforms, protocols, bandwidths and destinations smoothly, simply, seamlessly. Giving you and every department that depends upon your network more time to...rock and roll.

❖ For more about DynaStar, here's a hot number you should remember...

800-727-7215.



DYNATECH
COMMUNICATIONS, INC.

...The Power To Simply Connect

<http://www.dynatech.com>

Circle Reader Serv. #34

Intranets & the 'Net

Covering: Internet Technologies and Services
for Collaboration and Electronic Commerce

Briefs

■ **Netscape Communications Corp.** last week announced the availability of the **Secure Sockets Layer 3.0** software development tool kit, **SSL Ref 3.0**, for application developers creating security-enabled products for the Internet and intranets. **SSL Ref 3.0** supports client- and server-side authentication and a wide range of encryption mechanisms.

■ Last week at **PC Expo** in New York, **NetManage, Inc.** showed off a key feature of the new version of its **Chameleon TCP/IP** applications suite that's due for general release within 60 days. **Policy Management Architecture** will allow network managers to:

- Prioritize bandwidth traffic over the network.
- Control applications use by shutting down and preventing those applications that they don't want coming in.
- Implement security by encrypting packets as they go through the PC or setting up parameters that specify which protocols are allowed into the PC.

Chameleon will be priced at \$400 for one desktop. Volume discounts are available.

NetManage: (408) 973-7171.

■ **Dow Jones & Company, Inc.'s Business Information Services** division next week will ship its new **News/Retrieval software**. It features a built-in TCP/IP stack so users immediately can get online to access its newly expanded library of more than 3,000 publications.

Under a new, more predictable pricing scheme for the service, articles are priced at \$2.95 each, rather than \$1.50 per 1,000 characters. Company reports can range from \$1.25 to \$129, depending on the size of the document.

Dow Jones: (800) 522-3567.

■ **Oracle Corp.** last week released its updated **Web browser**, the **PowerBrowser 1.5**, with support for **HTML 3.0** as well as **Java** and **Basic Scripting** capabilities. The software, available for **Windows 3.X**, **Windows 95** and **Windows NT**, can be downloaded for free at www.oracle.com.

Stac's monumental comeback

Internet makeover includes product for remote access with Web browser interface.

By Doug Barney

What would you do if someone just handed you \$40 million?

For Stac, Inc. President Gary Clow, the answer was obvious: He bought his way onto the Internet.

In the early '90s, Clow had a pretty good thing going. His product, **Stacker**, doubled the capacity of hard-disk drives, a

So he bought himself a TCP/IP suite (including a Web browser), remote access software and backup software. But instead of staying in the browser and TCP/IP applications market, Clow adapted the tools to Web-ify his remote access product.

The result of this is twofold. On the financial side, Stac has recovered from the loss of **Stacker**, which it no longer sells. And at \$45 million in annual revenues, Stac is the largest it has ever been.

Reaching out to the Web

On the product side, Stac just announced **ReachOut 6.0**, a remote access tool that offers Web browser access to desktop files. **ReachOut** is designed to work with a variety of protocols

and transports. Users can connect to remote desktops through a standard modem, gateways, modem pools, a remote node server, ISDN or the Internet.

The Internet approach is the highlight. With **ReachOut**, you can turn a PC into a File Transfer Protocol server on the Internet. "You can publish [the contents of] your PC on the 'Net securely, and get to it from any desktop," explained Anita Habeich, **ReachOut** senior product manager. Once the PC is set up this way, a user can access the desktop through a Web browser, and use that interface to transfer files. The company is working on a way to remotely control the desktop through a browser over the Internet, but is concerned about latency issues, Clow said.

And for those afraid of leaving their PCs turned on, the company's **IntruderGuard** monitors all access. In the event of an unauthorized access attempt, **ReachOut** will either shut out a user's account or shut down the system being used to enter the net.

Stacker may not be a product anymore, but its technology lives on. **ReachOut** uses **Stacker's** compression scheme to crunch data prior to transport. In addition, **ReachOut** sends only the portions of a file that have changed. Once files have been exchanged, **ReachOut** will synchronize the directories of the remote and host PC.

ReachOut 6.0 will ship next month and sells for \$189. The product includes licenses for **DOS**, **Windows 3.1** and **Windows 95**, all in the same box. Users can download the beta version for free at <http://www.stac.com/robeta>. ■

STAC ELECTRONICS: TRANSFORMATION MILESTONES

1983: Company founded

Jan. 1993: Files suit against Microsoft for patent infringement.

Feb. 1993: Wins \$120 million in damages from Microsoft.

June 1994: Lawsuit settled. Microsoft buys \$40 million in Stac stock, commits to \$43 million in royalties.

Oct. 1994: Acquires Ocean Isle Software for \$19.1 million. Gains **ReachOut** remote access product.

March 1995: Acquires Crossware Development Corp. and Rememory Corp. Gains data protection and system recovery technology.

Oct. 1995: Acquires California Software for \$10 million. Gains TCP/IP suite.

pretty compelling tool when 60M bytes was the norm. But Microsoft Corp. doused Clow's campfire when it put this same type of compression into **MS-DOS 6.0**.

According to Clow, Microsoft not only killed off most of his market, it violated his patents in the process. A jury agreed, and in 1994 ordered Microsoft to pay Stac \$120 million in damages.

Bill Gates had another idea. Later that year, he convinced Clow to accept \$43 million in royalties, and as a goodwill gesture, Gates bought \$40 million in Stac stock. Sworn enemies were now friends, and Clow had the bucks to remake his company.

Like many with newfound wealth, Clow went on a buying spree. But instead of champagne, cars and boats, he bought four companies.

"We knew when Microsoft decided to put compression in **DOS** that we had to diversify," Clow said.

WebEx software does the browsing for you

New product offers people on the go automated dial-up and download from Web sites.

By Ellen Messmer

San Mateo, Calif.

Retrieving information from intranets or the public Internet can be time-consuming. You know the routine: Log on, browse around and wait for screens to refresh. But now there is software that can automatically do this work while you are away.

Traveling Software, Inc.'s **WebEx** software can dial up a Web site and retrieve data at predetermined times, storing pages and links on the user's desktop or laptop to review at a later time.

"We're replicating the Web experience offline," said You Mon Tsang, Traveling Software's product manager. "Bookmarks works with **WebEx**, as do image maps and **JavaScripts**."

The **WebEx** software lets users set their own digging levels based on whether they want to



WebEx goes on automated pilot to download Web data.

retrieve a single domain name page or multiple related subdirectories the Webmaster has assigned, Tsang said.

WebEx can be customized to limit a single hunt to anywhere from 500K to 25M bytes.

When **WebEx** makes its periodic trips to Web sites, it only downloads content changes. **WebEx** will also indicate to the user what is new or changed

since the last download.

WebEx, priced at \$29.95, is designed as a plug-in for the **Windows 95** versions of **Netscape Communications Corp.'s Navigator 1.2** and **Microsoft Corp.'s Internet Explorer 2.0**.

Traveling Software is also working on versions of the product for **Windows 3.1** and **NT**.

©Traveling Software: (800) 343-8080.

Find out about new software for downloading Web-based info. Select **News+** then **Intranets & the 'Net**.

Network World Fusion

<http://www.nwfusion.com>



"Funny,

I thought my

job description

said

MIS manager

not

test pilot."

HELP

Uh-oh. It's time to start designing a client/server network. All in the line of duty, of course. The trick is to do it somehow without risking your life.

The problem can be summed up in a few words. Words like "danger." And "why me?"

Wouldn't it be nice if you could see exactly how things were going to work before rocketing headlong into a sky full of question marks?

That's what we thought.

At IBM, we've spent years helping a wide variety of companies find an even wider variety of client/server solutions. Recently, we took what we've learned over those years, the accumulated wealth of knowledge, solutions, ideas, inspirations and innovations, and published them on a Lotus Notes® database.

We call it the IBM Client/Server Advisor System™, and it puts a vast reservoir of knowledge within easy reach. So whether you have to design

a system for sales and marketing, human resources, manufacturing or finance, you can start from a point of knowledge and experience. Together, we can devise a solution for your business by looking at the ways in which other businesses satisfied similar needs.

Of course, simply having a solution isn't exactly the same as having a solution that works for you. So we created Open Systems Centers (there are 42 of them around the world). There, we can get more specific, design a tailored solution and test it in a real-life multivendor environment. So you'll see just how it will work in your company.

All of which means you can spend less time worrying about the risks and start focusing on the opportunities. To find out more, visit www.ibm.com or call 1 800 IBM-7080, ext. G 130, for a free 16-page booklet.

Then sigh with relief.

Solutions for a small planet™

Technology Update

Keeping Up with Network Technologies and Standards

NETWORK HELP DESK

Network World tracks down answers to your questions. Please submit them to Chris Nerney via phone at (800) 622-1108, Ext. 451, the Internet at cnerny@nww.com or fax at (508) 820-1103.

I have a Novell, Inc. network to which I do not want to allow users to attach through the Attach command. I want all users to login using the login script. Is there a way to prevent users from attaching to my network?

Via the Internet

Depending on the version of NetWare in use, you can minimize the ability to attach but may not be able to totally restrict it, says Ron Nutter, a Master Certified Novell Engineer and Groupware CNE in the Lexington, Ky., area.

With NetWare 2.X and 3.X networks, you can remove the Attach command from the login and public directories.

With NetWare 4.X networks, an Attach command is not available since it is incorporated into the Login command, Nutter says. The average user will not know how to bypass the login script, but the power users on your network will be able to figure out how to get the Login command to attach by not running the script, he adds.

Be helpful

While you're in the Help Desk conference on Network World Fusion, come to the aid of your peers.

In Topic 54, someone needs to set up a dial-up connection and wants to manage the user account on a Macintosh. He wants to know what software to use for the Mac.

And in Topic 59, a network manager is looking for ways to set up a Windows 95 Push install that involves no user interaction.

The manager has been able to accomplish this hands-free install with one exception. He's installing Windows 95 to a new directory, leaving the users' Windows 3.X installation intact. Win95 Setup insists on displaying a dialog that warns the users that they'll need to reinstall Windows applications if they choose to install to a new directory. The users must then select a Yes or No button.

If you know of ways to automate the response to this dialog, drop him a line.

Multiprotocol over ATM spec takes shape

MPOA will preserve bridging and routing techniques for legacy and virtual LANs, allow background-compatibility.

By George Swallow and David Benham

Enterprise managers deploying production Asynchronous Transfer Mode networks using the ATM Forum's LAN Emulation (LANE) specification can relax: The emerging Multiprotocol over ATM (MPOA) spec will provide a nondisruptive, evolutionary step.

The MPOA specification will let enterprise managers build architectures that fully integrate LANE, routing, virtual LANs and ATM. The ATM Forum MPOA working group is chartered with developing a standard approach to forwarding Layer 3 data — such as the Internet Protocol or Novell, Inc.'s IPX — transparently over ATM backbones.

Building upon the LANE standard, MPOA will allow ATM backbones to support legacy Layer 3 protocols and their applications. When finished, MPOA will also let newer Layer 3 protocols and their applications, such as a packetized video using IP's Resource Reservation Protocol, take advantage of ATM's quality-of-service features over the same backbone.

Also MPOA will enable the separation of route calculation from the actual Layer 3 forwarding function. This provides three key benefits: integration of intelligent VLANs, use of cost-effective edge devices and development of an evolutionary path for clients from LANE to MPOA.

In the MPOA architecture, routers retain traditional functions so they can send short traffic flows. But in addition to their role as default forwarders, routers will become what are commonly called MPOA or route servers. They'll supply all the Layer 3 forwarding information used by MPOA clients, which include ATM edge devices as well as ATM-attached hosts. Ultimately, this scheme allows MPOA clients to set up direct cut-through ATM connections between VLANs for forwarding long flows.

Although it has plenty of work ahead, the ATM Forum has determined MPOA's architectural model and many of the

MPOA client-to-server protocols. It currently plans on finishing a full draft of the MPOA specification by February 1997.

MPOA fundamentals

The first order of business MPOA must address is the preservation of bridging and routing for legacy LANs and the VLAN topology in use. An MPOA network uses LANE for the bridging function. An emulated LAN's scope is a single Layer 3 subnet, whereas MPOA is focused on interconnecting subnets.

Using LANE provides a num-

edge device, the source must determine the ATM address of the exit point that corresponds to the respective Layer 3 address of the desired destination. An ATM-attached host can send an NHRP query to an MPOA server, which also gets reachability information from routing protocols, such as Open Shortest Path First (OSPF).

The MPOA server then responds with the ATM address of the exit point or ATM-attached host used to reach the destination Layer 3 address, or, if it doesn't know the answer, for-

defining mechanisms in addition to NHRP that will allow the servers to give Layer 3 forwarding information to edge devices that represent the optimal exit point for a given destination. This will reduce the potential for excess hops.

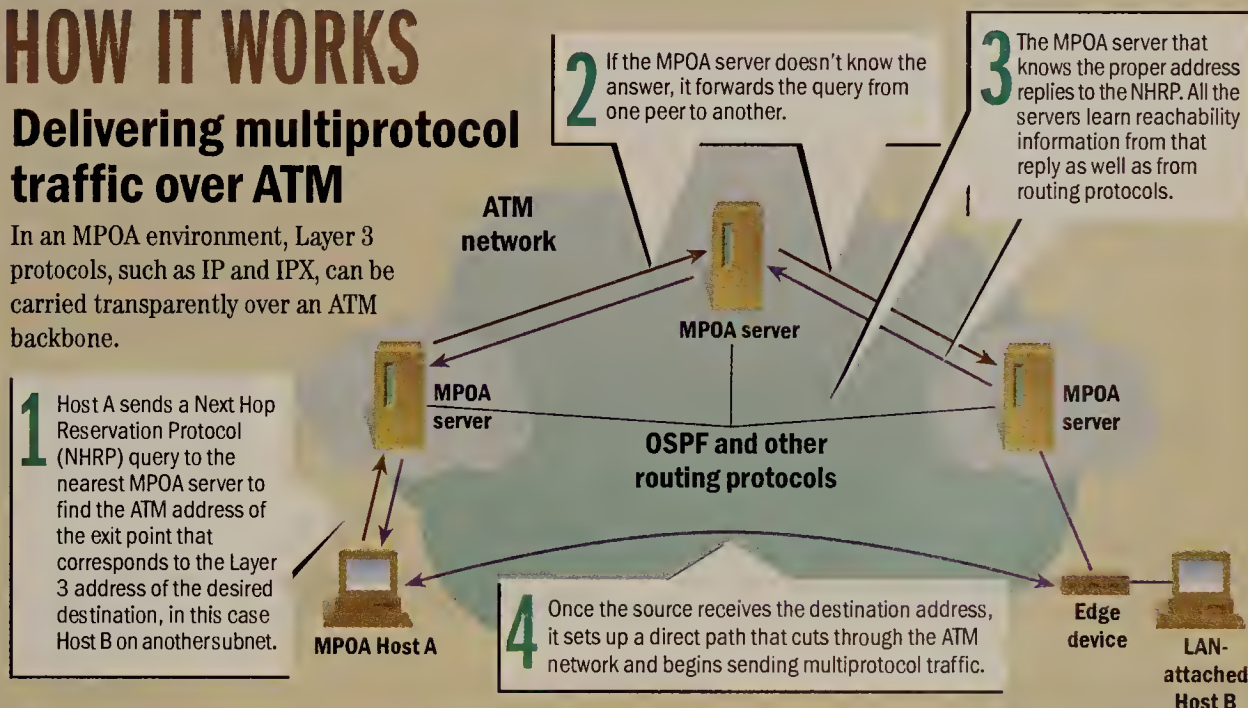
Clearing the air

It's noteworthy that the ATM Forum's Integrated Private Network-to-Node Interface (I-PNNI) is not an alternative to MPOA. The two do not perform the same functions or solve the same problems.

HOW IT WORKS

Delivering multiprotocol traffic over ATM

In an MPOA environment, Layer 3 protocols, such as IP and IPX, can be carried transparently over an ATM backbone.



ber of user benefits. It allows backward-compatibility, as an MPOA network can comprise MPOA clients and LANE-only clients. In fact, the default operation for an edge device can be LANE until it learns more, simplifying the topology configuration and start-up operation.

For the Layer 3 forwarding function, MPOA is adopting and extending the Next Hop Resolution Protocol (NHRP) being defined by the Internet Engineering Task Force. NHRP, which is expected to be published soon, is designed to operate with current Layer 3 routing protocols.

In order to set up a direct ATM connection between two ATM-attached hosts, or between an ATM-attached host and an

wards the query to other MPOA servers. Ultimately, the MPOA server serving the client that can reach the destination Layer 3 address will know the answer and reply. Once the source receives the reply, it can set up a direct, cut-through ATM connection.

In a VLAN environment, NHRP will reply with the ATM address of a router that serves the respective destination's network. If this VLAN has more than one router connected to it, then there is no guarantee that the reply will address the router closest to the destination. When it doesn't, the data packets are bridged between the responding router and the router that is actually closest to the destination. That router then forwards them.

The MPOA working group is

Rather I-PNNI could be used instead of other common routing protocols, such as OSPF.

Swallow is a principal engineer and Benham a senior ATM product manager at Cisco Systems, Inc. in San Jose, Calif. Swallow also chairs the ATM Forum's MPOA working group.

Need information?

Let *Network World* provide a quick primer on an important or emerging technology. If you have an idea for Technology Update, contact Beth Schultz by phone at (312) 283-0213 or via the Internet at bschultz@nww.com.

EDITORIAL INSIGHTS

Take it easy, AT&T

Only people who believe in the tooth fairy think the regional Bell operating companies are going to just hand over the keys to the local loop now that Congress has mandated local exchange competition.

But just because the reform bill has passed doesn't mean competitors who've never played the game suddenly have a special entitlement to the local market on terms they alone dictate.

Over the past few weeks, AT&T officials from Chairman Robert Allen on down have let fly with a series of harsh accusations and absurd demands on the RBOCs. They're declaring that the RBOCs won't meet the required competitive checklist for years, demanding overly large wholesale discounts, threatening to take every RBOC to arbitration over network interconnection and so on.

In one extreme example, AT&T dumped on US WEST for holding only 18 meetings on an interconnection agreement in the first 100 days after AT&T filed as a local carrier. That hardly seems scandalous, and AT&T's counteroffer to meet seven days a week was rightly ridiculed by US WEST officials. Even committed monopolists are entitled to Saturday nights off from telecom reform.



Back east, AT&T is demanding 41% off Bell Atlantic's rates in Maryland so AT&T can become a reseller with no network investment of its own. Is AT&T really suggesting that Bell Atlantic currently makes a 41% profit? No state utility commission would ever allow such a situation.

AT&T's comeback — that long-distance resellers routinely get 50% discounts off retail rates — is way off the mark. Regulators let long-haul carriers set list prices artificially high and then negotiate. RBOCs have no such latitude.

Other competitive local carriers are disavowing AT&T's demands, preferring to actually get interconnection deals signed. MFS Communications Co. can afford to accept reasonable discounts and interim interconnection arrangements because it has fiber in the ground and switches in place. In fact, MFS invested millions in preparation for this very moment. Why should a carrier that — literally — has not done the spadework control the debate?

It does AT&T customers no good for AT&T to make demands that will never be met. AT&T should lower the volume and concentrate on the nitty-gritty of its new local business.

David Rohde, Sr. Washington correspondent

Wait-and-see approach is best tack to take with gigabit Ethernet

Do you feel the need for speed? If so, you have plenty of choices: Asynchronous Transfer Mode, High Performance Parallel Interface (HPPI), Fibre Channel and now, gigabit Ethernet.

We've all been hearing about gigabit for the past six months or so. Despite the fact that there will be no industry standards for quite some time, vendors are already beginning to announce products based on this new high-speed transmission technology (NW, May 27, page 1). Some products will even be available later this year.

These vendors who are rushing products to market may be jumping the gun a bit. The technology is so new that the IEEE hasn't even begun to work on standards. In fact, it was just this past March when the IEEE Project 802 group approved the 802.3z Gigabit Ethernet standards project, creating a working group to explore the technology and develop standards. Those who are involved in this effort expect the standards to be developed and approved by 1998.

In support of the IEEE efforts, a number of leading networking and computer companies formed the Gigabit Ethernet Alliance last month. The alliance is a multivendor effort committed to providing users with open, cost-effective and interoperable gigabit Ethernet solutions. Among the members are 3Com Corp., Bay Networks, Inc., Cisco Systems Inc., Compaq Computer Corp., Intel Corp., Sun Microsystems, Inc. and UB Networks, Inc.

In hopes of speeding up the standards process, the members of this alliance intend to pool engineering resources and present the IEEE working group with proposals for working out the technical details of the technology. Moreover, the group will also test the interoperability of products developed by different vendors. This interoperability testing may be crucial for prestandard products, such as those likely to appear in the next 12 to 18 months.

Many people view gigabit Ethernet as a competitor to ATM, but alliance members call it a complementary technology. When both technologies are seen as backbone connections, they are competitors. However, gigabit Ethernet has some stringent distance limitations, so ATM is clearly the leader for WAN connectivity. Gigabit Ethernet does not even attempt to compete in this area — it's a campus technology. So there is room for both technologies in the market.

Like any new technology, gigabit Ethernet has its anticipated pros and cons. On the positive side, it alleviates traffic congestion on very large Fast Ethernet campus networks, and it does so with simpler and more familiar technology than ATM (that is, no LAN emulation is necessary). Gigabit Ethernet enables ultra high-speed data transfer, necessary for the delivery of real-time and multimedia applications. In addition, some proponents expect



Linda Musthaler

gigabit Ethernet to be cheaper than ATM, but that remains to be seen.

But don't abandon your plans for ATM just yet — gigabit Ethernet also has its detractors. For starters, it may only run on fiber and over short distances (realistically, between 2 and 20 km). Critics charge it may not be any cheaper than ATM, and it will take years to

develop the standards and technology.

In contrast, ATM is finally just around the corner, with standards expected to be completed by early next year.

All this posturing among the competing technologies is creating confusion in the marketplace. Vendors are hyping and hawking products that predate the standards, and in some cases, predate the business need. Many analysts who follow this market closely are advising their clients to take a wait-and-see attitude, unless there is a pressing business need today.

"Wait and see what develops" is certainly good advice when it comes to gigabit Ethernet, since the major vendors developing the technology aren't even in agreement over the approach. Compaq, 3Com and Sun are backing one approach proposed to the IEEE 802.3 committee last fall. Hewlett-Packard Co. and AT&T are behind a standard called IG-AnyLAN, similar to HP's 100VG-AnyLAN, which is being considered by the IEEE 802.12 committee. It's not clear this early in the game which approach will win the race, or if, like Fast Ethernet, there will be two approaches.

Vendors have a long road ahead of them just to educate the market about the technical aspects and business benefits of the technology. A few months ago, my colleagues at Currid & Co. conducted a survey of 100 companies regarding their projected bandwidth needs for the years 1996 to 2000.

Of the people surveyed, many are still looking to implement 100M bit/sec Ethernet, let alone 1,000M bit/sec Ethernet. Most of the people we talked to had never even heard of gigabit Ethernet, says Tony Croes, the survey leader. But, once we described what it is, they were quite interested. ATM is clearly the buzzword of the day, though.

You can follow the developments of the Gigabit Ethernet Alliance by checking out the group's Web site, <http://www.gigabit-ethernet.org>. You might even start talking to vendors such as NBase Communications that have already announced products. Let the vendors educate you, but be wary of deploying prestandard products unless you can afford to change course to follow the state of the industry later.

Musthaler is vice president of research at Currid & Co., a Houston-based information technology consulting firm. She can be reached via the Internet at linda@currid.com or by phone at (713) 789-5995.

"Wait and see what develops" is certainly good advice when it comes to gigabit Ethernet, since the major vendors developing the technology aren't even in agreement over the approach.

Teletoons

By Phil Frank and Joe Troise
baba@sfgate.com



Reader Service Card

IT'S EASY. Circle the number on this card which corresponds to the number at the bottom of the advertisement. Mail or FAX to (413) 637-4343 today. Information will be provided to you FREE of charge.

Circle the number below which corresponds to the number at the bottom of the advertisement for more information.

LAN WORLD								
1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27

DISPLAY ADVERTISING								
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99
100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117
118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135
136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153
154	155	156	157	158	159	160	161	162

MARKETPLACE								
163	164	165	166	167	168	169	170	171
172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189
190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234
235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261
262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279
280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297
298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315
316	317	318	319	320	321	322	323	324

Please check all of the products for which you are interested in receiving FREE information.

- COMPUTERS/PERIPHERALS**
600 ☐ Backup Devices
601 ☐ Cabling and Cabling Systems
602 ☐ Micros/PCs
603 ☐ Mainframes
604 ☐ Minis
605 ☐ Printers
606 ☐ Storage Devices
607 ☐ Terminals
608 ☐ UPS
609 ☐ Workstations
- SOFTWARE**
610 ☐ Applications
611 ☐ Client/Server Application Development
612 ☐ Communication/Terminal Emulation
613 ☐ Computer Operating Systems
614 ☐ Database Management/RDBMS
615 ☐ E-Mail
616 ☐ Groupware
617 ☐ LAN Operating Systems
618 ☐ Network Diagramming
619 ☐ Network Management
620 ☐ Security
621 ☐ Suites
622 ☐ Systems Management
- INTERNETWORKING**
623 ☐ Bridges
624 ☐ Routers
625 ☐ Gateways
- LOCAL AREA NETWORKS**
626 ☐ ATM Switches
627 ☐ Ethernet Switches
628 ☐ Fax Servers
629 ☐ Hubs/Intelligent Hubs
630 ☐ LAN Servers
631 ☐ Local Area Networks
632 ☐ Network Adapter Boards/NICs
633 ☐ Peer-to-Peer LANs
634 ☐ Print Servers
635 ☐ Remote LAN Access
- ☐ Remote Access/Communication Servers
660 ☐ Security
636 ☐ SNMP Network Management
661 ☐ Storage
637 ☐ Superservers
638 ☐ Wireless Networks
- REMOTE/WIRELESS COMPUTING**
639 ☐ Laptops, Notebooks
640 ☐ PCMCIA
641 ☐ Mobile Data Equipment and Services
642 ☐ Wireless Data Equipment and Services
- WAN EQUIPMENT AND SERVICES**
643 ☐ ATM
644 ☐ CIT (Computer Integrated Telephony)
645 ☐ Diagnostic, Monitoring and Test Equipment
646 ☐ DSU/CSU
647 ☐ E-Mail/On-Line Services
648 ☐ FAX Boards/Modems
649 ☐ Fiber Optics
650 ☐ Frame Relay
651 ☐ ISDN
652 ☐ Modems
653 ☐ PBX
654 ☐ Security
655 ☐ SMDS
656 ☐ T1, T3, Fractional T1 Mux and Services
657 ☐ Videoconferencing/Teleconferencing
658 ☐ WATS/MTS
- INTERNET/ELECTRONIC COMMERCE**
659 ☐ Internet Access Providers/Services
660 ☐ Firewalls
661 ☐ Web Servers
662 ☐ Internet Software Tools
- OTHER**
663 ☐ Education and Training
664 ☐ Storage Cabinets/Furniture

FILL OUT, DETACH AND MAIL

Now it's easy to find valuable information on the latest products and services with *Network World's* Reader Service Card - FREE!

FILL OUT, DETACH AND MAIL

Reader Service Card

IT'S EASY. Circle the number on this card which corresponds to the number at the bottom of the advertisement. Mail or FAX to (413) 637-4343 today. Information will be provided to you FREE of charge.

Circle the number below which corresponds to the number at the bottom of the advertisement for more information.

LAN WORLD								
1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27

DISPLAY ADVERTISING								
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99
100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117
118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135
136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153
154	155	156	157	158	159	160	161	162

MARKETPLACE								
163	164	165	166	167	168	169	170	171
172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189
190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234
235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261
262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279
280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297
298	299	300	301	302	303	304	305	306
307	308	309	310	311	312	313	314	315
316	317	318	319	320	321	322	323	324

Please check all of the products for which you are interested in receiving FREE information.

- COMPUTERS/PERIPHERALS**
600 ☐ Backup Devices
601 ☐ Cabling and Cabling Systems
602 ☐ Micros/PCs
603 ☐ Mainframes
604 ☐ Minis
605 ☐ Printers
606 ☐ Storage Devices
607 ☐ Terminals
608 ☐ UPS
609 ☐ Workstations
- SOFTWARE**
610 ☐ Applications
611 ☐ Client/Server Application Development
612 ☐ Communication/Terminal Emulation
613 ☐ Computer Operating Systems
614 ☐ Database Management/RDBMS
615 ☐ E-Mail
616 ☐ Groupware
617 ☐ LAN Operating Systems
618 ☐ Network Diagramming
619 ☐ Network Management
620 ☐ Security
621 ☐ Suites
622 ☐ Systems Management
- INTERNETWORKING**
623 ☐ Bridges
624 ☐ Routers
625 ☐ Gateways
- LOCAL AREA NETWORKS**
626 ☐ ATM Switches
627 ☐ Ethernet Switches
628 ☐ Fax Servers
629 ☐ Hubs/Intelligent Hubs
630 ☐ LAN Servers
631 ☐ Local Area Networks
632 ☐ Network Adapter Boards/NICs
633 ☐ Peer-to-Peer LANs
634 ☐ Print Servers
635 ☐ Remote LAN Access
- ☐ Remote Access/Communication Servers
660 ☐ Security
636 ☐ SNMP Network Management
661 ☐ Storage
637 ☐ Superservers
638 ☐ Wireless Networks
- REMOTE/WIRELESS COMPUTING**
639 ☐ Laptops, Notebooks
640 ☐ PCMCIA
641 ☐ Mobile Data Equipment and Services
642 ☐ Wireless Data Equipment and Services
- WAN EQUIPMENT AND SERVICES**
643 ☐ ATM
644 ☐ CIT (Computer Integrated Telephony)
645 ☐ Diagnostic, Monitoring and Test Equipment
646 ☐ DSU/CSU
647 ☐ E-Mail/On-Line Services
648 ☐ FAX Boards/Modems
649 ☐ Fiber Optics
650 ☐ Frame Relay
651 ☐ ISDN
652 ☐ Modems
653 ☐ PBX
654 ☐ Security
655 ☐ SMDS
656 ☐ T1, T3, Fractional T1 Mux and Services
657 ☐ Videoconferencing/Teleconferencing
658 ☐ WATS/MTS
- INTERNET/ELECTRONIC COMMERCE**
659 ☐ Internet Access Providers/Services
660 ☐ Firewalls
661 ☐ Web Servers
662 ☐ Internet Software Tools
- OTHER**
663 ☐ Education and Training
664 ☐ Storage Cabinets/Furniture

NetworkWorld

ISSUE DATE 6/24/96

CARD MUST BE RECEIVED BY 9/24/96

NAME

TITLE

COMPANY

STREET

CITY/STATE/ZIP

PHONE

FAX

E-MAIL ADDRESS

NetworkWorld

ISSUE DATE 6/24/96

CARD MUST BE RECEIVED BY 9/24/96



Pass this card along to a colleague so they, too, can get valuable product information FREE.

NAME

TITLE

COMPANY

STREET

CITY/STATE/ZIP

PHONE

FAX

E-MAIL ADDRESS

FREE Product Info

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 716 PITTSFIELD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

NetworkWorld

PO BOX 5090
PITTSFIELD MA 01203-9838



**Your resource for
enterprise network
computing information.**

FREE Product Info

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 716 PITTSFIELD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

NetworkWorld

PO BOX 5090
PITTSFIELD MA 01203-9838



FREE Product Info

MESSAGE



QUEUE

Token points

I found Skip MacAskill and Melinda Le Baron's column "Will no one cry for the token-ring user?" (May 20, page 35) to be on the mark in a couple of areas, but missing the whole issue in a couple of others.

In the first place, yes, IBM left its entire installed base hanging, but that leaves several other vendors with an opportunity to dive in and service the need. The reality is that it isn't practical to compare the issues that drove Ethernet users to switches with a "need" for switches in token-ring networks. Vendors have attempted to deliver token-ring versions of Ethernet switches to the market, only to find that no one needs them.

Furthermore, just because IBM got off-track and Madge Networks, Inc. can't think independently doesn't mean that 25M bit/sec ATM represents any significant market. The list of good token-ring switches looks more like a gang of could-have-beens than the best of breed.

Token-ring users need a practical means to segment and collapse their rings, which leaves only Madge and Xylan Corp. in the race. Xylan has been closer to the mark by providing both switching and virtual LAN services over both FDDI and CDDI, which gives users a very economical and practical solution.

Lynn Nye

President

NetResults

Portland, Ore.

MacAskill and Le Baron respond: In previous columns, we've pointed out that for token-ring users, switching is more an issue of better and more efficient network design to overcome the limitations and performance concerns of traditional PC-based source-route bridging.

Second, the column never implies that 25M bit/sec ATM represents any significant market. In fact, we agree that users need a practical means to segment and collapse their rings. We also pointed out that there were several technology options available to these users, including FDDI.

Leave politics out

The technical part of Dave Buerger's column "Boring? Yes. But fiber to the desk is ready for action" (May 20, page 82) was interesting and basically validated what I have believed all along.

My complaint pertains to the political

comments in the column. Readers who might think Bob Dole is OK can refer to any of the mainstream media to get all the derogatory comments we can stomach about Dole or anything remotely conservative. Why should we have to see this stuff in a technical trade publication, as well?

Rick Reineman

Stockton, Calif.

Calculated effort

I find the method of calculation used for the graphic entitled "The Network Paycheck" (May 20, page 61) highly deceptive and inaccurate.

While surveying 105 companies in the Los Angeles area is great for Los Angeles, the graphic fails when it uses the U.S. Department of Labor statistics to reflect regional cost-of-living differences. This extrapolation may work when comparing all career fields across the nation, but data communications manager is a specialized field—it may not be present in the same variety or necessity in all areas of the field.

The graphic also does not take into account the market saturation from area to area. There may be several thousand qualifying job hunters in Southern California, bringing salaries down, but they may be in high demand in Ames, Iowa, causing salaries to skyrocket.

The best way to ensure accurate data in a graphic like this would be to sample a population from each of the areas/cities listed, not by generalizing that the Department of Labor's figures speak for all careers.

David Gossett

Technical support manager

Bigg's Hyper Shoppes, Inc.

Milford, Ohio

Editor's note: The point is well taken. In the interest of saving space, we just were not clear enough in the graphic on how the survey data is collected. The 105 Southern California companies complete a full survey and report salaries for 67 MIS and networking positions with similar titles and functions for all their locations across the country.

Positive Support Review, Inc. (PSR) couples this data with information collected from close to 200 other companies across the country. Those companies provide information for all senior management positions listed in the survey, plus a subset of the survey's middle and lower level positions. PSR also collects salary information from individuals on its Web site.

PSR uses this data to create a benchmark salary for the various positions. Salaries for each city included in the survey were culled from at least a dozen organizations. Bureau of Labor statistics were used to validate the model.

Switch hitch

My compliments on your LAN switches Buyer's Guide (June 3, page 41). It was a very good overview on the various issues a potential buyer must consider. I found the graphic depicting reader views on LAN switches to be particularly interesting.

My only criticism concerns the Buyer's

Guide chart that accompanied the article. The inclusion of the Performance and virtual LAN support columns only confuses and deludes the reader. These numbers can lead one to mistakenly conclude that one product is better than another. In fact, often the correspondence between these numbers and how the products work in a customer environment is questionable. For example, I found it rather humorous that the numbers for the IBM 8272 Nways Token Ring LAN Switch and its various identical OEM versions were wildly different.

Stick to the objective data in your Buyer's Guides and leave the performance numbers and other such information for your in-depth product analysis performed by your independent labs.

Bob Rosenbaum

Consultant

Integrated Strategies

Acton, Mass.

I was intrigued by your recommendation of the Andrew Corp. SwitchLynx/TR in the Short List for your LAN switches Buyer's Guide, given that the SwitchLynx/TR is just an OEMed IBM 8272 Nways Token Ring Switch. The switch is actually available, at a lower price, from IBM, Proteon, Inc. and others. (You list the Proteon switch but omit the eight- and 12-port versions of the 8272 in your IBM entry.)

The 8272 is unique among token-ring switches in that it does not as yet support source-route bridging, which makes it impractical for certain token-ring configurations. So this makes your choice even more curious.

The token-ring aspect of this Buyer's Guide is very distorted in that it does not even mention Nashoba Networks, Inc., a pioneer and leader in token-ring switching; Cisco Systems, Inc.'s Catalyst 1600 (OEMed from Madge Networks, Inc.); Cabletron Systems, Inc.'s TSX-1620; or 3Com Corp.'s Link-Switch 2000 TR.

Anura Guruge

Independent consultant

New Ipswich, N.H.

The author replies: We included performance and virtual LAN data because we believe readers are entitled to know what the vendors say about their products' capabilities. We also cautioned readers against using the performance numbers for anything more than a relative gauge of raw throughput. Furthermore, five independent test labs would in all likelihood report five differing throughputs for the same switch platform, too.

In terms of the Short List selection, Andrew states that it plans in August to ship a \$3,000 add-on module that will enable the SwitchLynx/TR to support token ring-to-Ethernet switching. Andrew has for years remained focused on token ring and continues to solidly back token-ring users with performance-enhancing products. It is less clear where IBM is headed in terms of LAN networking. As for source-route bridging, both Andrew and IBM claim now to support it.

In reference to the missing products, Nashoba Networks did not submit information in time to meet our production deadline. The other vendors elected not to submit details on the particular products Mr. Guruge cites.

NetworkWorld

Editor in Chief

John Gallant

Editor

John Dix

NEWS

News Editor

Doug Barney

Associate News Editor

Bob Brown

Enterprise Editor

Charles Bruno

Phone: (407) 381-7801; Fax: (407) 381-7903

NETWORK WORLD FUSION

Adam Gaffin - Online Editor

Phone: (508) 820-7433; Fax: (508) 820-3467

Chris Nerney - Online Senior Writer

Phone: (508) 820-7451; Fax: (508) 820-3467

WANS & INTERNETWORKING

Michael Cooney - Senior Editor

Phone: (703) 830-8138; Fax: (703) 830-7963

Jim Duffy - Senior Editor

Phone: (508) 820-7525; Fax: (508) 820-3467

Tim Greene - Senior Writer

Phone: (508) 820-7422; Fax: (508) 820-3467

CARRIER SERVICES

Joanie Wexler - Senior Editor

Phone: (415) 938-0670; Fax: (415) 938-0676

David Rohde - Sr. Washington Correspondent

Phone: (202) 879-6758; Fax: (202) 347-2365

LOCAL NETWORKS

Christine Burns - Senior Writer

Phone: (508) 820-7456; Fax: (508) 820-3467

Jodi Cohen - Senior Writer

Phone: (508) 820-7449; Fax: (508) 820-3467

Ben Heskett - Staff Writer

Phone: (508) 820-7491; Fax: (508) 820-3467

CLIENT/SERVER APPLICATIONS

Barb Cole - Senior Editor

Phone: (619) 728-8858; Fax: (619) 728-8886

John Cox - Senior Editor

Phone: (508) 834-D554; Fax: (508) 834-0558

INTRANETS & THE 'NET

Ellen Messmer - Sr. Washington Correspondent

Phone: (202) 879-6752; Fax: (202) 347-2365

Carol Silwa - Senior Writer

Phone: (508) 820-7427; Fax: (508) 820-3467

INTRANET MAGAZINE

Beth Schultz - Executive Editor

Phone: (312) 283-0213; Fax: (312) 283-0214

Peggy Watt - Senior Editor

Phone: (415) 903-9519; Fax: (415) 968-3459

Managing Editor

Michelle Psychoeas

COPY DESK/LAYOUT

Clare Mansfield - Assistant Managing Editor

Sandra Gittlen - Copy Editor

John Robinson - Copy Editor

Wendy Hodgson - Layout Editor

Lori Montemurro - Layout Editor

ART

Rob Stave - Design Director

Thomas Norton - Associate Art Director

Pauline Chouinard - Graphics Coordinator

FEATURES

Features Editor

Paul Desmond

Phone: (508) 820-7419; Fax: (508) 820-1103

Jim Brown - Managing Editor, Features

Phone: (508) 820-7408; Fax: (508) 820-1103

Susan Collins - Associate Features Editor

Phone: (508) 820-7413; Fax: (508) 820-1103

Kathy Scott - Assistant Features Editor

Phone: (508) 820-7489; Fax: (508) 820-1103

Reviews

Lee Schlesinger - Test Center Director

Phone: (508) 820-7416

William Rinko - Gay - Director, NetworkWorld/PCWorld

Server Test Center

Phone: (713) 376-8771; Fax: (713) 251-7857;

E-mail: bill_rinko-gay@pcworld.com

Test Alliance Partners

Todd Coopee, Trinity College; James Gaskin,

Gaskin Computer Services; Steven Goldberg, *G Systems; John

Ketchersid III, Latsus, Inc.; Bob Larribeau, Larribeau Associates;

Howard and Kristin Marks, Networks Are Our Lives; Edwin Mier,

Mier Communications, Inc.; National Computer Security

Association; David Rorabaugh, Venture Computer Services;

Joel Snyder, Opus One; TeleChoice, Inc.

Contributing Editors

Daniel Briere, David J. Buerger,

Mark Gibbs, James Kobielus, Edwin Mier,

Mark Miller, Alan Pearce

Buyer's Guide Contributors

Tony Croes, Linda Musthaler, Currid & Co.; Mark Miller, DigINet

Corp.; James Kobielus, LCC, Inc.; Edwin Mier, Mier

Communications, Inc.; Daniel Briere, Christopher Finn,

Christine Heckart, Liza Henderson, Beth Gage, TeleChoice, Inc.

Teletoons

Phil Frank, Joe Troise

Assistant to the Editor

Cheryl Crivello

Editorial Assistant

Glenna Fasold

Colin Ungaro - President/CEO

Evilee Thibault - Senior Vice President/Publisher

Mary Fanning - V. P. Finance & Operations

Mary Kaye Newton - Assistant to the President

Board of Directors

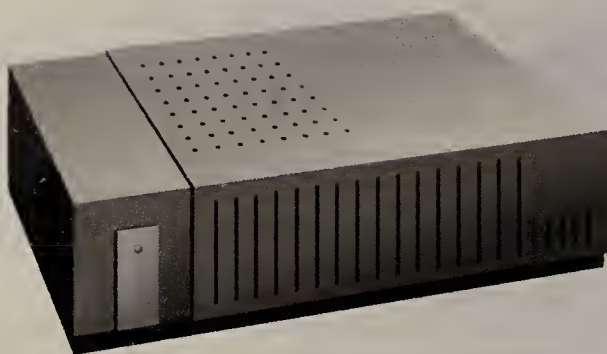
Colin Ungaro, Pat McGovern,

Bob Metcalfe, Joe Levy, Kelly Conlin

These will run your Corporate Intranet...



Modem / 28.8 Kbps



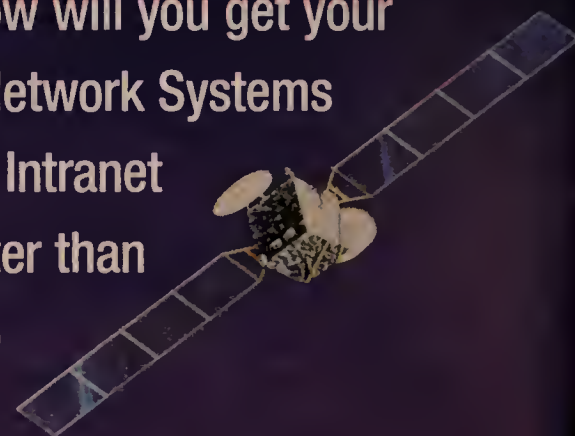
Frame Relay / 56 Kbps



ISDN / 128 Kbps

HUGHES NETWORK SYSTEMS SATELLITE BASED INTRANET DELIVERY.

You've heard all the buzz about Intranets, but how will you get your Corporate Intranet off the ground? Hughes Network Systems (HNS) has the ideal solution for solving the Intranet delivery problem: getting high speed (greater than 200Kbps) from your corporate web server to remote locations.



This will make it fly.

**Satellite
Greater Than
200 Kbps**

Discover the power of the Intranet for your corporate applications. Use Internet technology to support your corporate applications with multimedia rich features such as real-time video and audio. Hughes can deliver an entire turnkey solution for your company that will adapt to and expand with your corporate application needs. For more information about getting your Corporate Intranet off the ground, call 301-428-5622.

HUGHES
NETWORK SYSTEMS

A HUGHES ELECTRONICS COMPANY

<http://www.hns.com>

Netscape Communications, the Netscape Communications logo, Netscape, and Netscape Navigator are trademarks of Netscape Communications Corporation. Netscape has not endorsed or otherwise sponsored the advertised product or service.

Circle Reader Service #37



**"Thanks to
Sprint Business,
more of our flowers
are popping up
all over the world."**

— Meg Whitman, CEO, FTD Inc.

FTD,[®] a company known the world over for its fine floral arrangements, needed to streamline its international order process. They used to rely on fax, phone, telex and cable to transmit orders.

"Sprint helps us process orders in half the time."

Sprint put FTD on its global data network. Now, florists can transmit information instantly. So a florist in Indonesia can send an order directly to a florist in England, or anywhere else in the world, with exceptional speed and accuracy.

"Our business is blooming all over the world!"

Now, Sprint helps FTD florists in over 143 countries send more flowers, to more people, worldwide than ever before.

Find out how Sprint Business can
help grow your business, too.

Call Sprint Business

1-800-816-REAL

www.sprint.com



We help business do more businesssm

Is CIF a viable solution for delivering ATM to the desktop?

Not only is Cells in Frames (CIF) a viable way of delivering Asynchronous Transfer Mode to the desktop, but it may be the only practical way to do it widely. CIF is practical because it is affordable and provides a workable migration strategy. Low latency and end-to-end managed quality of service (QoS) are the benefits of ATM to the desktop that no other approach can provide anywhere near the low cost of CIF anytime soon.

At Cornell University, we look at ATM as the means for achieving a fully integrated services network supporting a whole series of communications and multimedia applications. We look at CIF as the means for soon affording a campuswide ATM network.

We see the first and most critical use of this low-latency, managed QoS network to be plain old telephone service (POTS), provided via desktop workstations. Why telephony? Well, as Willie Sutton said when asked why he robbed banks, "That's where the money is."

At Cornell, as at many organizations, the budget for advanced multimedia is essentially zero. But the private branch exchange sucks up over two-thirds of our communications dollars, a river of cash flowing out of the campus.

CIF is a protocol for carrying ATM cells efficiently over Ethernet media without substantially increasing end-system processing. One or more cell payloads are preceded in an Ethernet frame by a CIF header that contains an ATM cell-header prototype.

Migration is easy and inexpensive with CIF because the protocol allows you to use your existing 10Base-T Ethernet network interface cards, wiring and NIC installation.

First, the existing 10Base-T hubs are replaced by CIF Attachment Devices (CIF-AD). The CIF-ADs initially function as frame switches, so the installation is simple — users see no real difference in operation, and no technician visit to the user workstation is required. Next, a 155M bit/sec uplink is connected from the CIF-AD to an ATM backbone switch.

Finally, one by one, workstation software is updated with an ATM protocol stack and CIF shim. Each user then has an individual path to the ATM backbone at a useful fraction of 10M bit/sec.

Contrast this step-by-step installation with the sort of cataclysmic upheaval needed to simultaneously replace all the NICs and hubs for each existing network. Then think about doing it for 15,000 users.

CIF saves money three ways, compared with the least expensive alternative, 25M bit/sec ATM. First, as noted above, CIF requires no new NIC, installation or wiring. Second, a CIF-AD supporting 10M bit/sec rather than 25M bit/sec can have twice the port density and amortize the cost of the uplink over more users. Third, only half as many backbone switch ports are required.

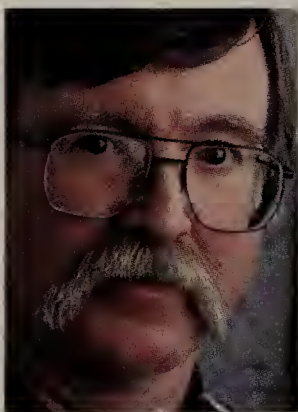
You may be concerned that CIF will not perform well enough with a half-duplex Ethernet, or that some existing workstations won't have enough CPU to handle more cycles in the driver.

Granted, CIF may not serve the most demanding 10% of end systems adequately — but it doesn't need to. Remember, CIF is about being able to get to an all-ATM campus quickly and affordably. For demanding end systems, such as servers or heavy-duty users, we can afford to use 25M (or 155M) bit/sec ATM. But the network is still all ATM, all managed the same, running all the same native ATM applications. For some users, just substituting a full-duplex, high-performance Ethernet NIC would be a nice, simple boost.

CIF will be available early next year. Some 30 vendors are working together in the Cells in Frames Alliance, and the specification is essentially complete.

Read more about CIF at <http://www.cif.cornell.edu>. If you manage an installed base of thousands of 10Base-T-connected users, you can save millions of dollars and migrate to ATM much sooner with CIF.

Cogger is assistant director for advanced technologies and planning in Cornell University's campus networking organization and one of the principal collaborators on CIF. He can be reached via the Internet at R.Cogger@cornell.edu.



Richard Cogger

A viable solution for Asynchronous Transfer Mode to the desktop must substantially deliver the benefits of ATM to the client workstation. The Cells in Frames (CIF) solution brings the concept of ATM to the desktop, but the characteristics of Ethernet prevent the CIF client from realizing the benefits.

CIF's goal is to enable ATM applications for the large installed base of Ethernet clients at little cost. Its chief components are client software at the desktop and a CIF Attachment Device (CIF-AD). A closer look at these components reveals the flaws in the CIF approach.

CIF brings to the desktop ATM signaling, an API and a mechanism for providing prioritized access to an Ethernet segment. All of the good that comes along with these ATM software components cannot make up for the shortcomings of Ethernet — namely, the unpredictable nature of the bandwidth.

ATM requires efficient management of bandwidth resources. Bandwidth on an Ethernet link varies with the utilization of the link, making management of the bandwidth difficult. Given this fundamental difference between a point-to-point, switched ATM link and a dedicated Ethernet link, it is likely that native ATM applications would perform less predictably in a CIF environment.

ATM at the desktop is, after all, about enabling native ATM applications — specifically, allowing users to execute networked voice, data and video applications in an integrated environment.

The basic requirements for such an environment are quality-of-service (QoS) management (traffic prioritization) and bandwidth. CIF delivers on the QoS front but provides no more bandwidth.

Clearly, the applications that require the advantages of ATM resource management are bandwidth intensive. A single MPEG2 videostream, for example, will likely require from 6M to 10M bit/sec of dedicated bandwidth, which consumes the entire dedicated Ethernet link. Upgrading to Fast Ethernet would provide additional bandwidth but at the cost of a new adapter and a more expensive CIF-AD.

Because the CIF-AD proposes to provide ATM connectivity to CIF clients at little cost, it deserves some attention here. The CIF-AD must provide at least segmentation and reassembly, flow control and access to ATM network services. Given these requirements, the CIF-AD is either an ATM switch or a 10M bit/sec (at low utilization factors) ATM concentrator. The concentrator implementation is more likely since it can be adapted from an Ethernet switch.

A subtle point that affects the cost of this solution is that a dedicated 10M bit/sec port is required for each CIF end system. It's likely that most of the installed Ethernet base is on shared Ethernet ports (repeaters). This implies that the CIF-AD should cost the same as an Ethernet repeater.

Furthermore, the CIF-AD provides CIF client support functions; it does not provide ATM network services. For ATM network services, the CIF-AD must support a high-speed uplink to an ATM switch. Today, 25M bit/sec ATM desktop solutions are available for less than \$500 per port. This price includes the ATM switch port, the ATM adapter and supporting ATM services such as LAN Emulation. The CIF-AD includes many of the hardware components of an ATM-attachable Ethernet switch, which conservatively costs \$600 per port.

In the end, the CIF solution, though technically sound, is an insufficient alternative to switched, workgroup ATM. In fact, the aggressive pricing of today's workgroup ATM products suggests that CIF is the best solution to a problem that never was.

If you require ATM at the desktop, then it makes more sense to take a look at IBM's 8285 ATM Workgroup Switch and First Virtual Corp.'s First Multimedia Switch. Both of these products bring 25M bit/sec ATM to the desktop at 10M bit/sec switched Ethernet prices.

Emer is president of Phillip Emer, Inc., a consulting firm specializing in ATM network technology, and manager of advanced network development at a large university in the Southeast. He can be reached at (919) 515-5491.



Phillip Emer

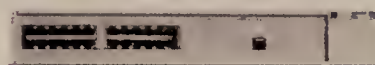


Whatever your width requirements, 3Com has a solution to fit you perfectly.

Our Fast Ethernet & Switched Ethernet solutions are just the right fit for any workgroup.



EtherLink® III PCI 10 Mbps NIC



SuperStack™ LinkSwitch™ 1000



Fast EtherLink PCI 10/100 Mbps NIC



SuperStack LinkBuilder® FMS™ 100

Sophisticated desktop applications? Distributed databases? Multi-media applications? If you're uncertain about which bandwidth solution to apply to which situation, talk to us. Whether it's Switching, Fast Ethernet, or some combination of the two, we've got exactly what you need to outfit your workgroup. From NICs, to hubs, to switches, all of our solutions are flexible, cost-effective, and easy to implement. And all are

tailored to increase performance now and into the future. To receive your free Scaling Workgroup Performance Kit, call **1-800-NET-3Com**.



Ascom Timeplex, NET and Newbridge each have a plan to get you to frame relay and ATM. Do they make sense for you?

Pumping Up your muxes



By Paul Korzeniowski

Users that were busy in the 1980s and early '90s installing T-1 networks based on time-division multiplexers (TDM) are at a crossroads. In most cases, those T-1 nets are fully capitalized, bought and paid for, and now you have to determine your next step.

It's likely you'll make the move to some form of cell switching, be it frame relay or Asynchronous Transfer Mode, because it offers more bandwidth efficiency than TDM technology. The next question, then, is whether to stick with your existing T-1 mux vendor when making the migration or consider new blood.

Many companies with large TDM networks (20 nodes or more) are determining that staying with their current vendors offers the least costly and least disruptive migration path. The cost savings stem from reduced support and training costs, more coherent network management, and protection of much of the original mux investment.

The three top T-1 TDM mux suppliers — Ascom Timeplex, Inc., Network Equipment Technologies, Inc. (NET) and Newbridge Networks, Inc. — offer customers a frame relay migration path that protects those investments to varying degrees. They offer plug-in modules so their muxes, which rely on proprietary routing techniques, can coexist with their higher end products.

At some point, though, you likely will need to introduce a new platform to your network. With Ascom Timeplex, the change is needed when mov-

ing to frame relay. Newbridge requires it when migrating to ATM. NET can get you to frame relay fairly painlessly, but its ATM path is not yet clear.

If you're using switches from one of these vendors (and most are, as the graphic on this page shows), analysts agree it usually makes sense to stick with your current vendor.

"TDM vendors have enhanced their products lines so companies can operate hybrid networks mixing ATM, TDM and frame relay connections," notes Curtis Price, an industry analyst with International Data Corp., a Framingham, Mass., market research firm.

Yet, not all companies opt to stay with their current suppliers. A company with a small network — say a dozen nodes or less — may view swapping out wide-area backbone nodes as worth the trouble if the new vendor offers features the current supplier can't match or has a better long-term growth path (see story, page 56).

The Timeplex story

Ascom Timeplex was one of the first major T-1 success stories with its Link/1 (and later, Link/2) multiplexers, but the devices have limited growth potential when it comes to cell or packet switching. To add frame relay to a Link/2 network, you have to buy at least one Synchrony ST-20 switch, which ranges in price from \$20,000 to \$80,000.

The product was designed to allow companies to mix TDM, frame relay and ATM connections on the same backbone network. Link/2 multiplexers can be connected to the network via the Link Gateway Module, which has a price tag of \$1,200 and is

due to ship this summer. If you want to translate the TDM channels into frame relay packets, you'll need Timeplex's Frame Relay Server module, which supports five T-1 lines and costs \$8,000.

Saturn Global Network, Inc., a New York company selling international value-added network services to financial services companies, found that path attractive. Saturn is a division of London money broker MW Marshall and Company, Ltd. and was created to act as an internal support group for the firm. It now offers services in 34 cities, including London, Sydney, Australia, and Tokyo, located in 15 countries. Since the mid-1980s, the firm relied on Ascom Timeplex Link/2 muxes to support its services and now has more than 100 of them on its network.

Last fall, Saturn examined ways to expand its network repertoire with services such as LAN-to-WAN connectivity. A frame relay network is better suited to these

offerings because it can more easily handle sporadic, large file transfers. Saturn evaluated frame relay equipment from Cascade Communications Corp., General Data-

MUX KINGPINS

Worldwide 1995 T-1 multiplexer market breakdown

Vendor	Revenue (millions)	Percentage of market
Newbridge	\$346.2	28.3%
NET	\$226.8	18.6%
Ascom Timeplex	\$190.6	15.6%
Tellabs	\$142.2	11.6%
StrataCom	\$81.1	6.6%

Between them, Newbridge, NET and Ascom Timeplex control nearly two-thirds of the total T-1 mux market.

comm Industries, Inc. and Ascom Timeplex.

"We invested a great deal of time and effort building our network infrastructure and do not want to swap out all our equipment to offer new services," says Jon Polonez, general manager at Saturn. The company is testing a handful of Synchrony 20 switches and is a beta-test site for the Link Gateway Module.

Staying with Ascom Timeplex products should ease network management training. Central administrators can monitor Link/2 frame relay and TDM connections with Timeplex's Time/View 2000 network management system, which Saturn runs on Hewlett-Packard Co.'s OpenView network management platform. The Synchrony Management System also runs on OpenView.

Synchrony also offers Saturn a clear long-term migration path: The product can be upgraded to the Synchrony ST-1000 ATM switch with the addition of the Data InterNodal Link, which has a price tag of \$18,750. That strategy is just the ticket for Saturn, which does not have enough traffic to warrant a close look at ATM now but could in a few years.

The NET route

NET users looking to upgrade have a couple of choices. The firm was one of the first T-1 TDM players to offer a frame relay upgrade path with its Frame Relay Exchange, a frame relay switch plug-in module for NET IDNX multiplexers. More recently, it announced the PX-3 module, which costs between \$15,700 and \$31,650, and works with up to 32 T-1 lines — a 400% increase from its predecessor. It is scheduled to ship by the end of the summer.

Although early to the frame relay market, NET has not yet delivered an ATM switch and does not expect to this year. "Currently, there are still many standards issues — especially concerning routing legacy data — which need to be resolved," says Robbie Forkish, a vice president and chief technology officer at NET.

Last fall, the company broadly outlined its ATM strategy in its Vista architecture. Although details are sketchy — no products, pricing or availability have been announced — NET has said it plans to deliver an ATM backplane that plugs into the high-end IDNX 90 multiplexer.

"Making the ATM backplane compatible with the IDNX is a good idea," says Rick Malone, a principal with the Vertical Systems Group consul-

tancy in Dedham, Mass. "NET's customers tend to have the largest, most sophisticated networks; they spend \$100,000 or more per node. Because their infrastructures are so large, they want minimal disruption."

Analysts agree the task is no small technical feat. NET expects microprocessor power to rise and costs to fall so the company can shrink ATM switching capabilities onto a plug-in module. But competitors have determined those tasks are too complex for an add-on and instead base their ATM capabilities on new hardware.

Whether NET can prove its competitors wrong is a key issue for First Union Corp., a Charlotte, N.C., bank with 45,000 employees stationed in a dozen Southeastern states. The bank began installing NET's IDNX multiplexers in 1986 to connect regional offices on a private network.

During the past decade, the network has grown to connect 2,100 branch and regional

offices. Traffic between the sites has been so great that the company installed T-3 lines to connect two data centers in Charlotte and one in Jacksonville, Fla.

To accommodate recent acquisitions, the bank plans to extend that network in coming months to offices in Philadelphia, Newark, N.J., and New Brunswick, N.J., says Chris Cagle, a vice president and manager of the enterprise network technology group at the bank.

First Union expects to upgrade those connections to ATM lines in a year or two. The bank also plans to evaluate ATM offerings from the top half-dozen suppliers but would prefer to stay with NET. For that to happen, NET will need to flesh out the Vista architecture soon. "In early 1997, NET will have to demonstrate that it will be able to deliver ATM products," Cagle says.

Newbridge nuances

Newbridge Networks was the last major vendor to enter the T-1 market but, in Malone's judgment, offers the most scalable multiplexers.

Moving from TDM to frame relay

ALL PAID OFF

There are roughly 5,200 companies in the U.S. that have T-1 networks, according to Rick Malone, a principal at the consultancy Vertical Systems Group in Dedham, Mass. Most use muxes purchased between 1988 and 1991, he says, and about 80% of that installed base of equipment is now fully depreciated.

Making the switch

While most companies would prefer to stay with their current supplier when upgrading their T-1 nets, there are instances when it makes sense to go with a new vendor.

The most clear-cut example is when your network is small. Union Pacific Railroad of Omaha, Neb., operated a three-node T-1 network relying on Ascom Timeplex, Inc. Link/2 multiplexers through the 1980s. The firm, which has 35,000 employees, decided to migrate from IBM mainframes to distributed Unix systems and needed network equipment capable of handling bursty LAN traffic. Tom Burns, an assistant systems engineer at the railroad, determined the Ascom Timeplex equipment was better suited to static mainframe transmissions.

In 1990, the railroad issued a request for proposals to a half-dozen T-1 multiplexer suppliers, including Newbridge Networks, Inc., Network Equipment Technologies, Inc., StrataCom, Inc. and Ascom Timeplex.

The railroad selected StrataCom's IPX multiplexers because the devices supported dynamic routing and were based on a proprietary packet architecture that delivered more efficient bandwidth utilization. The IPXs were also able to reroute

traffic more quickly, Burns says, which increased network reliability. Gradually, the network grew to 22 sites.

In 1994, Union Pacific decided frame relay offered still better bandwidth utilization than the original StrataCom design. Burns says making the switch to frame relay simply involved a change of interface cards.

Now that the network has grown larger, the railroad is more hesitant about swapping out suppliers. Burns anticipates that Union Pacific will add Asynchronous Transfer Mode capabilities

to its network during the next two to five years. The company will look at other vendors, but StrataCom now holds the lead position.

"StrataCom's IGX switch has a similar design and runs the same management software as the IPX, so a change would require minimal training," Burns says.

Not every company is content with following its T-1 multiplexer supplier's migration path to ATM, however.

"Large companies are finding that the benefits of ATM are so great that they are turning to other vendors with more modern, more flexible network platforms," says Ravi Narayanan, the senior manager for Magellan marketing at Northern Telecom, Inc. of Richardson, Texas.

Mouvement Desjardins, a bank in Montreal, fits into that category. The company relied on 18 Timeplex Link/2s to connect 15 offices throughout Canada. Two years ago, the bank, which has 30,000 employees, decided to migrate to ATM and selected Nortel's Magellan system. As the migration moves forward, the bank continues to examine ATM equipment from other vendors.

Roger Tessier, a senior analyst at Mouvement Desjardins, said the bank selected the Magellan because it offered a more flexible architecture than the alternatives. In 1995, the bank installed Magellan switches at its Montreal and Toronto offices.

The migration has presented its challenges. For example, the bank has been unable to get the Magellan echo cancellers to operate, and support has been an issue. Being unfamiliar with the new equipment, network technicians have required a great deal of training. Nortel charges by the hour, and the cost has snowballed to one-third of the switch purchase price, which Tessier declined to disclose. Tessier is negotiating to put a cap on this expense.

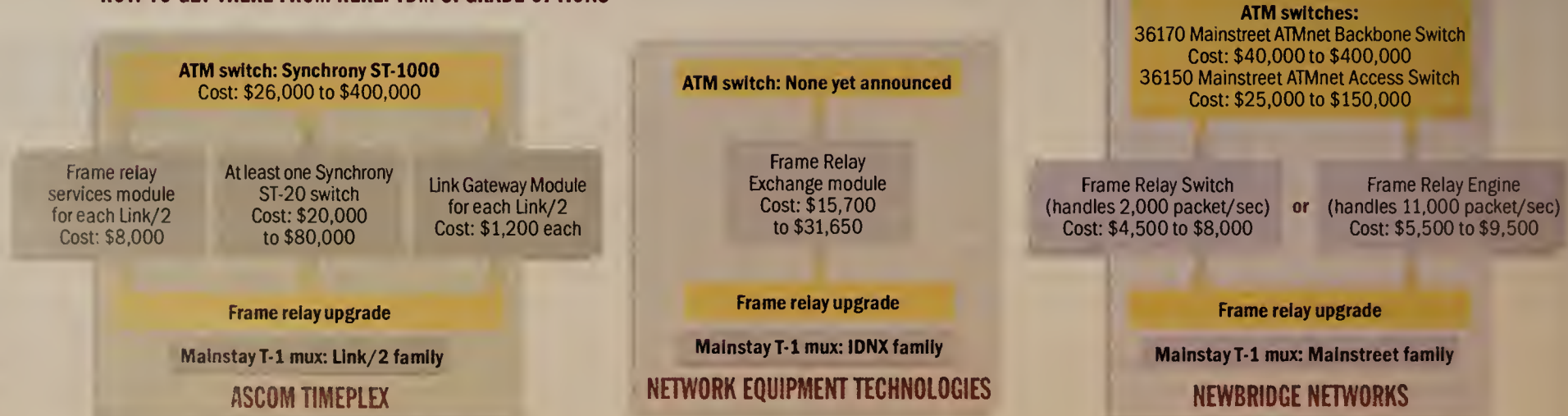
Despite the problems, Tessier remains undaunted: "We have encountered unexpected issues, but the transition has gradually become easier and easier for us."

Most companies are wary of following Tessier's lead, but that thinking could change during the next few years. As Nortel's Narayanan put it: "At one time, large companies were leery of moving from SNA to TCP/IP. As the benefits of such a change became clear, many organizations made the switch. We expect the same evolution will occur as companies examine moving from TDM to ATM networks."

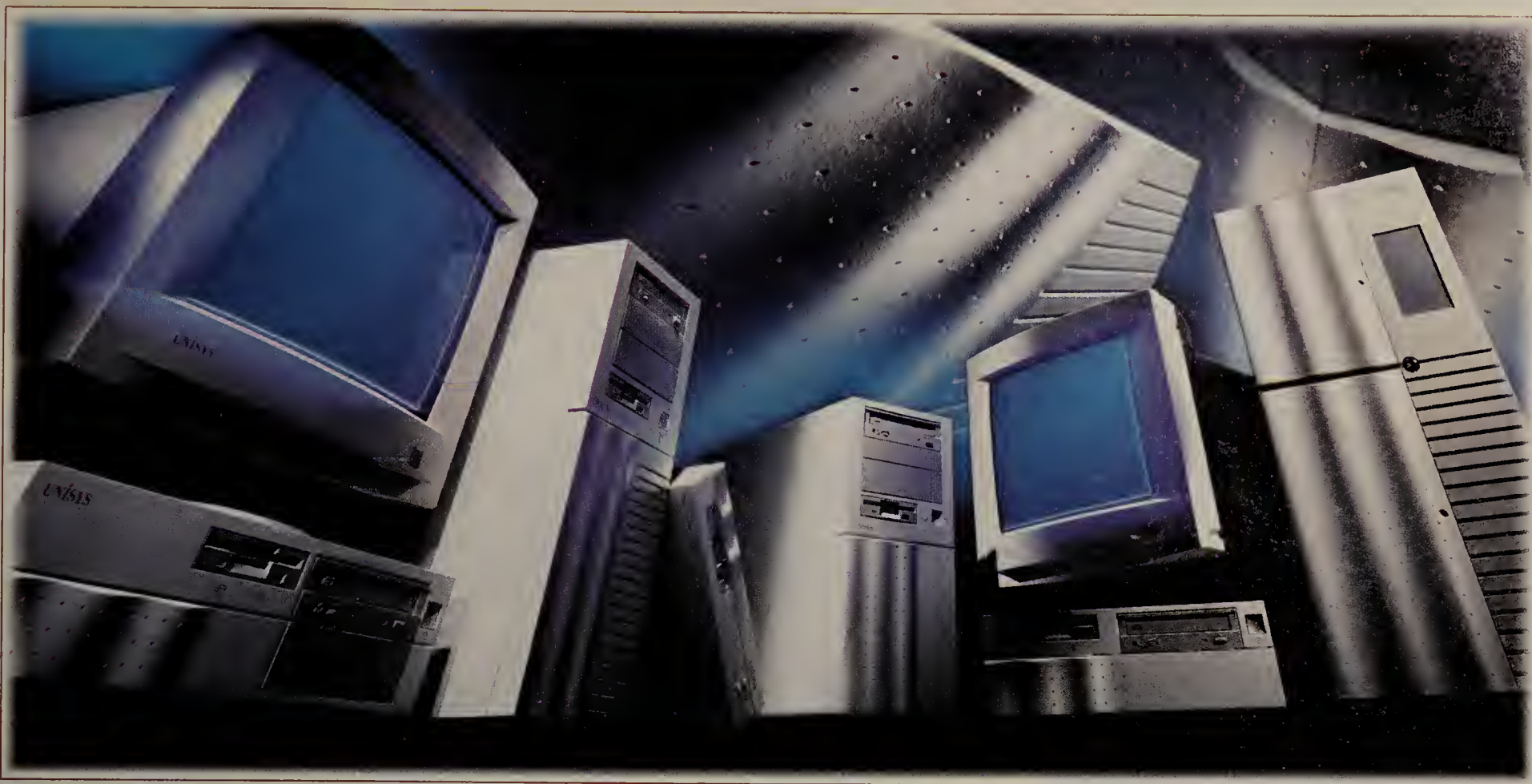
—Paul Korzeniowski



HOW TO GET THERE FROM HERE: TDM UPGRADE OPTIONS







Everything you're looking for in PCs.

From a place you probably didn't look.

You might not think of Unisys as a place to find state-of-the-art PCs for your company. But



all that's changed with *Aquanta*™ PCs and servers. This new product line matches—and even surpasses—the best the PC world has to offer.

Aquanta means quality, with rigorous testing that ensures mainframe-class dependability for mission-critical applications.

Aquanta means performance, with one of the industry's most powerful and scalable product lines—including multiprocessor Pentium and

Pentium Pro models, SMP servers and fault-resilient servers.

Aquanta means compatibility, with support for all major operating systems and networks to simplify client/server computing.

Aquanta means support, through Unisys worldwide experience implementing technology across departments, companies and countries.

And finally, *Aquanta* means this: While we may not be the first place you look for PCs, we just might be the last.

<http://www.unisys.com/adv> or 1-800-874-8647, ext. 244

© 1996 Unisys Corporation. Aquanta is a trademark of Unisys Corporation. The Intel Inside Logo, Pentium and Pentium Pro are registered trademarks of Intel Corporation.

UNISYS

The Information Management Company

involves adding plug-in modules to Newbridge Mainstreet multiplexers. The Frame Relay Switch, which costs \$4,500 to \$8,000, provides the multiplexer with frame relay access ports, much like a FRAD. The Frame Relay Engine, which has a price tag between \$5,500 and \$9,500, offers full-fledged frame relay switch capabilities.

By installing those modules, users can upgrade their Mainstreet muxes to New-

bridge's 36120 frame relay switch, which supports 256 T-1 lines. When bought new, it ranges in price from \$30,000 to \$200,000.

Bloomberg Radio, Inc. of New York, which provides financial information to investors, followed both routes. In 1990, the company, which has 2,500 employees worldwide, linked its 20 main offices with Mainstreet multiplexers.

As the financial information supplier's

business grew, limitations with a separate X.25 network became clear. "The X.25 network was based on old network equipment so maintenance became problematic," says Leigh Reynolds, a worldwide network designer at Bloomberg Radio.

As a replacement, the company examined frame relay equipment from Cisco Systems, Inc., Netrix, Inc., Newbridge and StrataCom, Inc. The financial services company was moving into foreign mar-

kets so international service and support were important features. A plus for Newbridge was that the X.25 network could be melded with the TDM network to eliminate redundant connections.

In the fall of 1994, Bloomberg began adding interface cards to upgrade its muxes and also bought a number of Newbridge's 36120 frame relay switches. "We put in 1,000 [permanent virtual circuits] per week for six to nine months," Reynolds says. The network now has 500 nodes in 87 countries.

Reduced network management training costs are one reason to stay with a current supplier. But Bloomberg found that Newbridge's 46020 Mainstreet Network Management system has been of limited help in designing the frame relay network.

Conference Chairpersons: David Passmore, *Decisys, Inc.* and Chris Thomas, *Intel Corporation*

Key Presenters: Craig Benson, *Cabletron Systems*; Marshall Rose, *Dover Beach Consulting*; and John McConnell, *McConnell Consulting*

5 Dynamic Conference Tracks

- Advanced Network Management Technology
- The Business of Network Management
- Managing Internets & Intranets
- The Business of Systems Management
- Advanced Systems Management Technology

6 Intensive, Full Day Tutorials

Featuring more than **40** of the industry's leading solution providers

Boston - August 14-15, 1996

Call (508) 470-3880

For a detailed conference brochure.

Please mention your priority code MCAWN05

Call (508) 470-3870 for exhibitor information



Register by
June 28 to receive
a FREE copy of
Network World's
NetDraw Plus
Software

Worldwide T-1 multiplexer revenue

In billions

1995 **\$1.223**

1996 **\$1.339**

1997 **\$1.407**

1998 **\$1.435**

1999 **\$1.451**

2000 **\$1.413**

SOURCE: VERTICAL SYSTEMS GROUP, DEDHAM, MASS.

Congestion has been a key issue. Frame relay networks rely on end nodes rather than intermediary devices to rectify errors. Consequently, a faulty connection can result in multiple retransmissions, which hinders network performance. Solving that problem has proved difficult because Reynolds says his Newbridge management systems offer little performance data.

Like Saturn Global Networks, Bloomberg does not yet have sufficient traffic to warrant a serious examination of ATM. To make that move, customers have to purchase other Newbridge equipment — either the 36150 ATM Access switch, which has a price range of \$25,000 to \$150,000 and handles 5,600 ATM cells per second; or the 36170 ATM switch, which costs from \$40,000 to \$400,000 and switches about 30,000 cells per second.

In part because of price tags like that, ATM is still out of the reach for most organizations. But as you dabble with bandwidth-intensive applications such as video, you'll need to determine how best to support them.

Many plan to take a cautious approach. "Our TDM network supports all of our users and our daily business," says First Union's Cagle. "Whenever we examine any changes, the first question asked is: 'How will this impact our existing users?' We desire as little disruption as possible." If that's the position you're in, experts agree your best option is to stick with your current vendor.

Korzeniowski is a freelance writer in Malden, Mass., specializing in networking issues. He can be reached at paulkorzen@aol.com.

CONFERENCE SPONSORS:

NetworkWorld



CONFERENCE CO-SPONSORS:

IBM

SI

digital



CommVault Systems

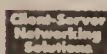
Ganymede Software Inc.

Seagate
Enterprise Management Software

Cabletron Systems
The Complete Networking Solution

3Com

Bay Networks



NOVELL

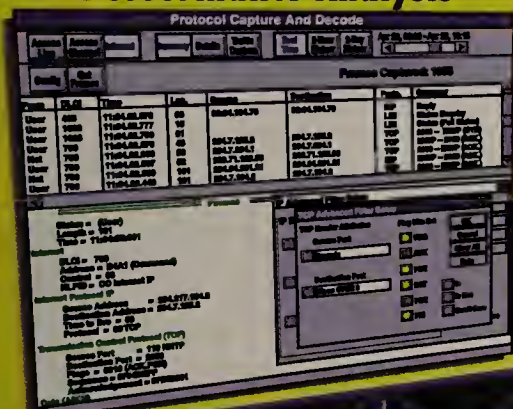
MCI

XYLAN
Corporate Networking Systems For
The Next Generation of Computing

SOME WORDS OF ADVICE ABOUT DSUs FOR YOUR INTERNET ACCESS...

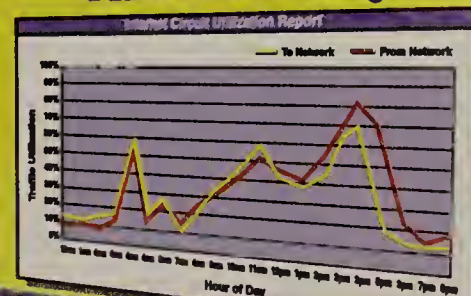
Get Real

Performance Analysis



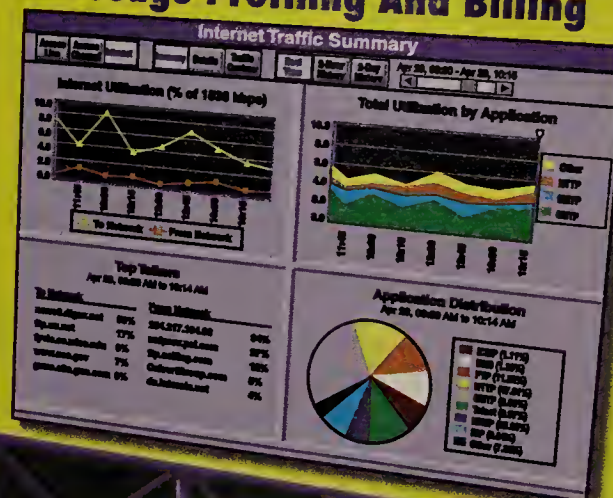
Get Real

Bandwidth Planning



Get Real

Usage Profiling And Billing



Get Visual On Ramp!

A Real Managed Internet Access Device

**Call us toll-free at 888-I'NET-DSU
or visit us at <http://www.visualnetworks.com>**

Really Slick

VISUAL NETWORKS

... See the performance

MAY WE SUGGEST A TO INTERNET



MORE OPEN APPROACH SECURITY?

Somewhere behind that big, impressive barrier you put up to protect your information, a global explosion is taking place. It's called the Internet, and it's making the possibility of worldwide connectivity a reality. There's just one problem.

You're locked in. You can see the potential. You just can't explore it.

And now, while the rest of the world enjoys the vast networking opportunities of the Internet, you enjoy the stifling solitude of quiet isolation. How nice.

If this all sounds a bit too familiar, you'll be happy to know that the next generation of network security is here. Presenting CheckPoint FireWall-1.™ Based on an entirely new architecture called Stateful

Platform Support	Unmatched Application Support	Virtual Private Network Solution	Fully Configurable Remote Users	Distributed Management
• SUN SPARC™ based systems • Intel x86 or pentium • HP PA 700/800 • MS NT™	• Over 120 predefined • First to support new applications — e.g. RealAudio, VDOlive, SQL*Net • Easy point & click creation of new services	• Fully integrated selective encryption • Integrated key management • Transparent to users	• User Authentication • Client Encryption for mobile users	• Single security policy enterprise wide • Manage multiple firewall's simultaneously • Platform independent management • Real-time logging, tracking & auditing

Nobody supports a wider variety of the applications, services and capabilities you need. In fact, version 2.1 is now available with Microsoft NT support and client encryption for the mobile user.

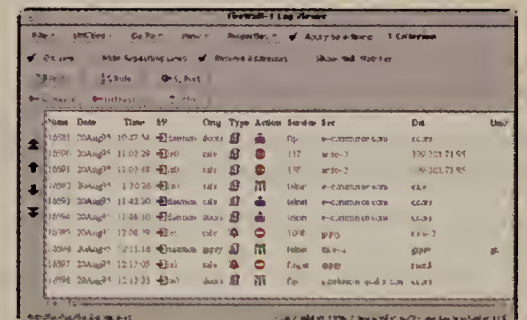
Inspection technology, FireWall-1 gives you what other firewalls simply can't offer — true global secure connectivity.

Of course, you can't have an open approach to network security without supporting all the applications you need. So FireWall-1 supports literally hundreds of new and existing applications.

You can create your own custom applications, and FireWall-1 will support them, too. Quite simply, FireWall-1 does more than just restrict what you don't want. It enables what you do.

As the first to support multimedia and database applications such as RealAudio,™ VDOlive, and SQL*Net, FireWall-1 is quick to meet your present and rapidly evolving networking needs.

VPN's. Intranets. Internet Commerce — anything, anywhere you want to take your network.



Manage multiple firewalls from a single security policy.

With FireWall-1 you can manage one policy across your whole enterprise, including multiple firewalls, both local and remote, from a single location. The graphical user interface is intuitive and easy to use. You're also getting firewall software from the market share leader. A proven program that's used by more major corporations the world over.

The promise of the Internet is here, and with it comes a world of connectivity. CheckPoint FireWall-1 lets you unlock the full potential of that world.

Call 1-800-429-4391, Ext. 1 for your copy of "Roadmap To Internet Security." Or visit our web site at www.checkpoint.com for more information.



CheckPoint FireWall-1 is continually receiving top honors from the industry's toughest product reviewers and testers.

CHECKPOINT
Software Technologies, Ltd.
[Global Secure Connectivity]

Circle Reader Service #28

"Don't miss out!
Join thousands of your
colleagues who continue to benefit
from this valuable, essential training."

INTERNETWORKING:

Designing LANs, WANs and Broadband Networks

**DIRECTED BY
MARK MILLER**

The ever-changing internetworking landscape, fueled by emerging broadband technologies, dramatically challenges traditional LAN and WAN architectures. Network professionals must now integrate local and wide-area networks with new technologies including fast Ethernet, ATM, frame relay and SMDS. These and other new technologies hold the promise of more efficient and ever-faster communications across enterprise networks.

Taught by Mark Miller or Dr. Carl Shinn, both leading consultants and internetworking experts, this seminar will teach you how to design and implement multiprotocol, multi-operating system internetworks that seamlessly integrate both legacy and emerging technologies.

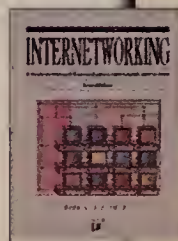
This information-packed two-day seminar will help you . . .

- Evaluate internetworking hardware and software solutions for optimum network operation
- Analyze repeaters, bridges, switches, routers and gateways to determine which one is appropriate for a particular configuration
- Prepare for the next generation of internetworking challenges: Frame relay/SMDS, frame relay/ATM and SMDS/ATM connections
- Understand key internetworking protocols such as TCP/IP, IPX/SPX, X.25 and XNS
- Determine bandwidth requirements for both leased line and broadband circuits utilizing traffic studies

- Troubleshoot your environment through case studies that detail protocol operation and illustrate typical internetworking challenges
- Understand the key internetworking features of AppleTalk, Banyan VINES, NetWare, OS/2 LAN Server and Windows NT
- Discover some key applications for narrowband ISDN technology
- Compare the operation of ATM, frame relay and SMDS, and discover the role of the broadband implementers: the Frame Relay Forum, the ATM Forum and the SMDS Interest Group
- Understand the detailed operation and key performance characteristics of Ethernet, IEEE 802.3, token ring and FDDI
- Evaluate the differences between Transparent Bridging, Source Routing and Source Routing Transparent Bridging internetworking standards
- Utilize available software tools for network optimization and modeling process
- See how SNMP plays a key role in internetwork management including the management and operation of broadband networks
- Understand the operation of IP-based routing
- Match the LAN application with the appropriate WAN broadband technology
- Understand TCP/IP and the Internet protocol suite, including ARP, ICMP, UDP, SMTP and TELNET
- Explore the internetworking challenges of remote access and wireless communications

1996 LOCATIONS AND DATES

Dallas, TX	July 23-24	Washington, DC	Oct. 8-9
San Jose, CA	July 30-31	Atlanta, GA	Oct. 22-23
St. Louis, MO	Aug. 6-7	Boston, MA	Nov. 6-7
Irvine, CA	Aug. 20-21	Seattle, WA	Nov. 12-13
New York, NY	Sept. 11-12	San Francisco, CA	Dec. 5-6
Chicago, IL	Sept. 24-25		



\$895 REGISTRATION FEE INCLUDES . . .

- Comprehensive seminar workbook
- Copy of best-selling *Internetworking*, 2nd edition, by Mark A. Miller
- Four exclusive protocol reference guides: Ethernet, Token Ring, FDDI and LAN Cabling
- Valuable course diskette containing reference information on internetworking implementation, documentation and standards
- Free 6-issue subscription to *Broadband Networking News* — the leading newsletter for news and analysis on broadband networks
- Luncheon and break refreshments

Broadband Networking News
Business News & Analysis of Frame Relay, ATM, and SMDS

Note: If you can't attend, a full attendee materials kit for the Internetworking seminar is available for just \$99.95!

Web/E-Mail Information

Obtain full seminar information and register on-line in the Professional Development Group section on our Web site at:

www.nwffusion.com

OR

receive full seminar information via e-mail by sending a request to:

seminars@nwffusion.com

Please put the word "LAN" in the subject field.

Call 1-800-643-4668
Register today for
the seminar nearest you!

Dial Our **FAX-BACK** Information Line at
1-800-756-9430
for a complete seminar
outline and registration form.
When prompted, request document #80.

NetworkWorld **PC WORLD**

SERVER TEST SERIES

Compaq ProLiant stands tall

June is bustin' out all over — in workgroup servers, that is.

The highlight of this month's batch was the Compaq Computer Corp. ProLiant 1500, which turned in tremendous performance for a workgroup server. Its score even beat that of The Panda Project's Archistrat 4S Model 300 enterprise server, which we'll review in full next month.

For price/performance in the workgroup arena, Acer America Corp.'s AcerAltos 900 follows close on the heels of Digital Equipment Corp.'s Prioris XL, which we reviewed in April.

Rounding out this month's roster is IPC Technologies, Inc.'s Austin Affinity XE server, which failed to crack our top five performance or value leaders.

processor sockets. There's room for two processors, but only one was installed in our review unit. There's enough room to store small objects, which makes it very serviceable if not space-saving.

Outside, wheels on the back and a handle in front let you roll the IPC Server short distances.

The reset button is impossible to hit by accident; you need a tool to push it.

Besides the hardware, Austin provides little. The only software bundled is drivers for installed hardware. Documentation is primarily from OEMs, with an adequate technical user's guide from Austin. There's no quick-start guide and no software installation help.

Compaq ProLiant 1500 5/133 Model 2100

VENDOR: Compaq
CONTACT: (800) 345-1518
PRICE: \$8,449
PERFORMANCE RATING: 45.8



This ProLiant 1500 is our new top workgroup performer, turning in almost enterprise-level performance.

The front bezel of this large server unlocks and swings open to provide access to five hot-pluggable drive bays. Drives lock in with a nice latch feature that gives confidence that the drive is well latched, but the tray is tall compared to the height of the drives. Drive-activity LEDs are easy to see.

Inside, two large fans plus one in the power supply provide cooling. It's easy to access all the slots, SIMMs and processor sockets. This processor card has room for two processors, but we used only one in our tests.

While there's plenty of room inside, if the machine were just a little longer front to back, Compaq Computer Corp. could have fit at least three

AcerAltos 900

VENDOR: Acer
CONTACT: (800) 733-2237
PRICE: \$5,355
PERFORMANCE RATING: 36.5



Note: A lower price/performance index indicates better value.

This is the smallest server we've seen. We like to think of it as a desktop on steroids. An integrated Adaptec SCSI controller, ECC memory and chassis lock are the only nods to server requirements.

The external bays are hidden behind a door that doesn't lock. There isn't much room for hard-drive expansion, and there are no hot-pluggable bays.

We tried to look at Acer America Corp.'s bundled ServerManager for NetWare, but it doesn't support Version 4.1 yet. It loads two NLMs that allow you to monitor the server from a Windows-based client. You can set alert conditions and thresholds on several OS-dependent parameters, including cache full, CPU utilization and disk full. Alert options include running a file, calling a pager and sending cc:Mail.

Acer's StartUp utility provides a way to install The Santa Cruz Operation's OpenServer 5.0, Novell NetWare 4.1 and 4.1 SMP.

It is also used to make diskettes, run diagnostics, configure the system, provide information for service and support, and display online documents. We used it only to make a set of diskettes for installing the NetWare ServerManager. It was easy to use and provided good access to online documentation.

Most documentation that comes with the AcerAltos is republished by Acer from the original vendor's version (Windows NT Server documentation is

Microsoft's, and the 3Com adapter's documentation came from 3Com), which gives a nice integrated feel to the manuals.

The documentation for ServerManager and StartUp comes from Acer. ServerManager documentation looks good, but most of StartUp's was electronic. There are sufficient diagrams and screenshots to help the user understand what the purpose of the program is and how it is used.

Austin Affinity XE

VENDOR: IPC Technologies
CONTACT: (800) 443-7914
PRICE: \$11,395
PERFORMANCE RATING: 30.8



The front of this large tower case sports an excellent set of hard-drive LEDs. This is the easiest server we've yet seen for telling what the individual drives in the array are doing.

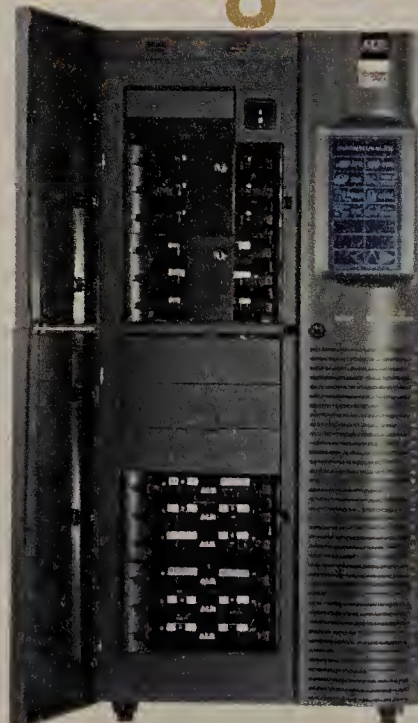
The case locks in three places — on a plastic cover, on the hard-drive cover, and on a side panel that reveals the motherboard and the PCI/EISA bus. Inside, clear labels help you replace the drives and configure the hot-pluggable backplane.

The interior is roomy, with accessible SIMMs and



Download complete server test results from Network World Fusion (<http://www.nwfusion.com>). Select NetRef, Buyer's Guides and Reviews, then Server Test Series.

Calling all vendors



We invite and encourage all vendors of file and application servers to participate in our Server Test Series. For information on how to be included, contact the director of the Network World/PC World Server Test Center, Bill Rinko-Gay, at (713) 376-8771 or bill_rinko-gay@pcworld.com.

NetworkWorld PC WORLD

SERVER TEST SERIES

more drive bays. An excellent configuration label inside the door leaves out the options information of the ProSignia 500 we looked at.

Compaq bundles Insight Manager, an application that allows an administrator to use Simple Network Management Protocol-based management tools to monitor the server remotely, and SmartStart, which streamlines network operating system installations.

All documentation is from Compaq and of good quality. It covers getting the machine up and running, as well as typical start-up problems, installing options and instructions for running bundled software. There's more online than printed.

NetworkWorld PC WORLD

PERFORMANCE LEADERS

	Model	Issue tested	Top performance
Workgroup	ProLiant 1500 5/133 Model 2100	This issue	45.8
	DEC Prioris XL Server 5133	4/22/96	41.4
	HP NetServer 5/133 LH	2/19/96	38.6
	AcerAltos 900	This issue	36.5
	Dell PowerEdge SP 5133-2	5/27/96	32.3

Our performance rating is derived by adding the file server performance in scripts per minute to the average of the two application server test results at the 16-client level. We then divide the price of the server as tested by the performance rating to get our price/performance index.

NetworkWorld PC WORLD VALUE LEADERS

	Model	Issue tested	Price/performance
Workgroup	DEC Prioris XL Server 5133	4/22/96	143
	AcerAltos 900	This issue	147
	Dell PowerEdge SP 5133-2	5/27/96	161
	Compaq ProSignia 500 Model 5/120-2100	2/19/96	175
	ProLiant 1500 5/133 Model 2100	This issue	184

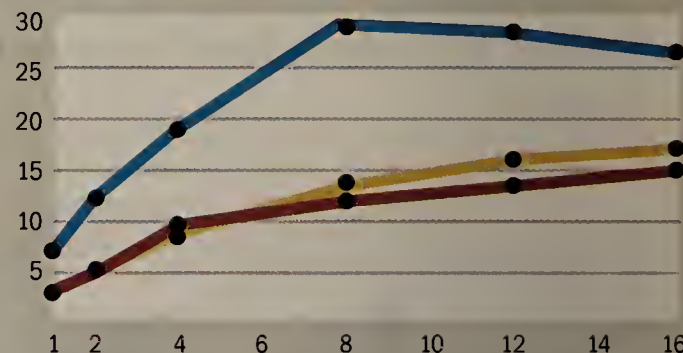
The Network World/PC World Server Test Series is a monthly feature in which we evaluate file and application servers. Our testing measures performance from the client's point of view, and we report the time it takes to complete typical tasks. A lower price/performance ratio indicates better value. A complete description of our test methodology and the configuration of our Houston-based lab is available on Network World Fusion.

THE INSIDE STORY

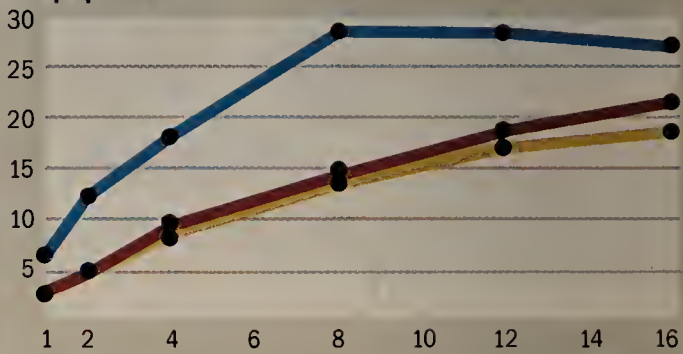
	Acer		Compaq		IPC/Austin	
Model	AcerAltos 900		ProLiant 1500 5/133 Model 2100		Affinity XE	
Processor	133-MHz Pentium with 512K-byte L2 cache		133-MHz Pentiums with 512K-byte L2 cache		120-MHz Pentium with 512K-byte L2 cache	
Maximum processors	166-MHz Pentium with 512K-byte L2 cache		2 166-MHz Pentiums with 512K-byte L2 cache		2 120-MHz Pentiums with 512K-bytes cache	
Memory	As tested	Maximum	As tested	Maximum	As tested	Maximum
	32M bytes	192M bytes	32M bytes	256M bytes	64M bytes	512M bytes
Base memory	32M bytes		32M bytes		32M bytes	
Slots	Provided	Open	Provided	Open	Provided	Open
	PCI	3	2	1	4	2
PCI/EISA	0	0	1	1	0	0
EISA	3	3	5	5	6	5
Memory	0	0	0	0	0	0
Processor	0	0	1	0	0	0
Total	7	6	9	7	10	7
Bays	Provided	Open	Provided	Open	Provided	Open
	Internal	1	5 hot-swappable	3	12 hot-swappable	8
External	5	2	3	1	5	3
Total	6	2	8	4	17	11
Storage Adapter	Adaptec AIC 7880P		NCR TolerANT Integrated		Mylex DAC960 PCI RAID adapter	
	PCI		PCI		PCI	
Capacity	4G bytes		4.2G bytes		4G bytes	
Model	Seagate Barracuda ST15150		Seagate Barracuda ST32550W		Conner CFP2107E	
Average seek time	Not available		9 msec		9 msec	
Transfer rate	Not available		49M bit/sec		Not available	
Embedded cache	Not available		512K bytes		256K bytes	
Maximum drive capacity	Internal	External	Internal	External	Internal	External
	16G bytes	224G bytes	21.5G bytes	301G bytes	48G bytes	
Base drive capacity	2G bytes		1.05G bytes		2G bytes	
CD-ROM	Sony CDU 76s CD-ROM		Bootable 4X		4x SCSI	
Network adapter	3Com 3c595		Compaq NetFlex PCI100M bit/sec		Cogent eMaster/400 Quartet with 4 100M-bit/sec Ethernet connections	
Fault tolerance features	ECC RAM, optional RAID		Hot-swappable drives, optional RAID adapter, ECC RAM, Automatic Server Recovery		Hot-swappable drives, RAID controller	
Security features	Chassis lock		Chassis lock, administrator and power-on passwords		Locking front bezel, locking drive bezel, locking side panel, power-on and administrator passwords	
Certifications			NetWare 3.12 and 4.1, Windows NT 3.51, SCO Open Server, IBM OS/2 Warp, IBM LAN Server, Banyan VINES		NetWare	
Bundled software	Windows NT Server 3.51, Acer StartUp, Server Manager		Compaq SmartStart, Compaq Insight Manager			
Miscellaneous	Postage-free container for recycling styrofoam, 3-year on-site warranty, 5x12 toll-free phone support		3-year on-site support, 7x24 toll-free support		Warranty: 3 years parts and labor, 1-year on-site repair, 5x11 toll-free technical support	

PERFORMANCE SUMMARY

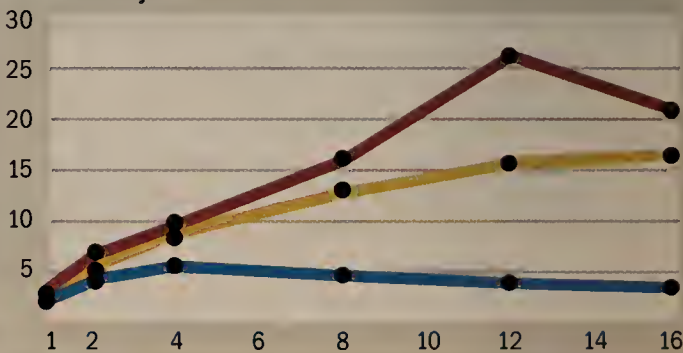
AcerAltos 900



Compaq ProLiant 1500



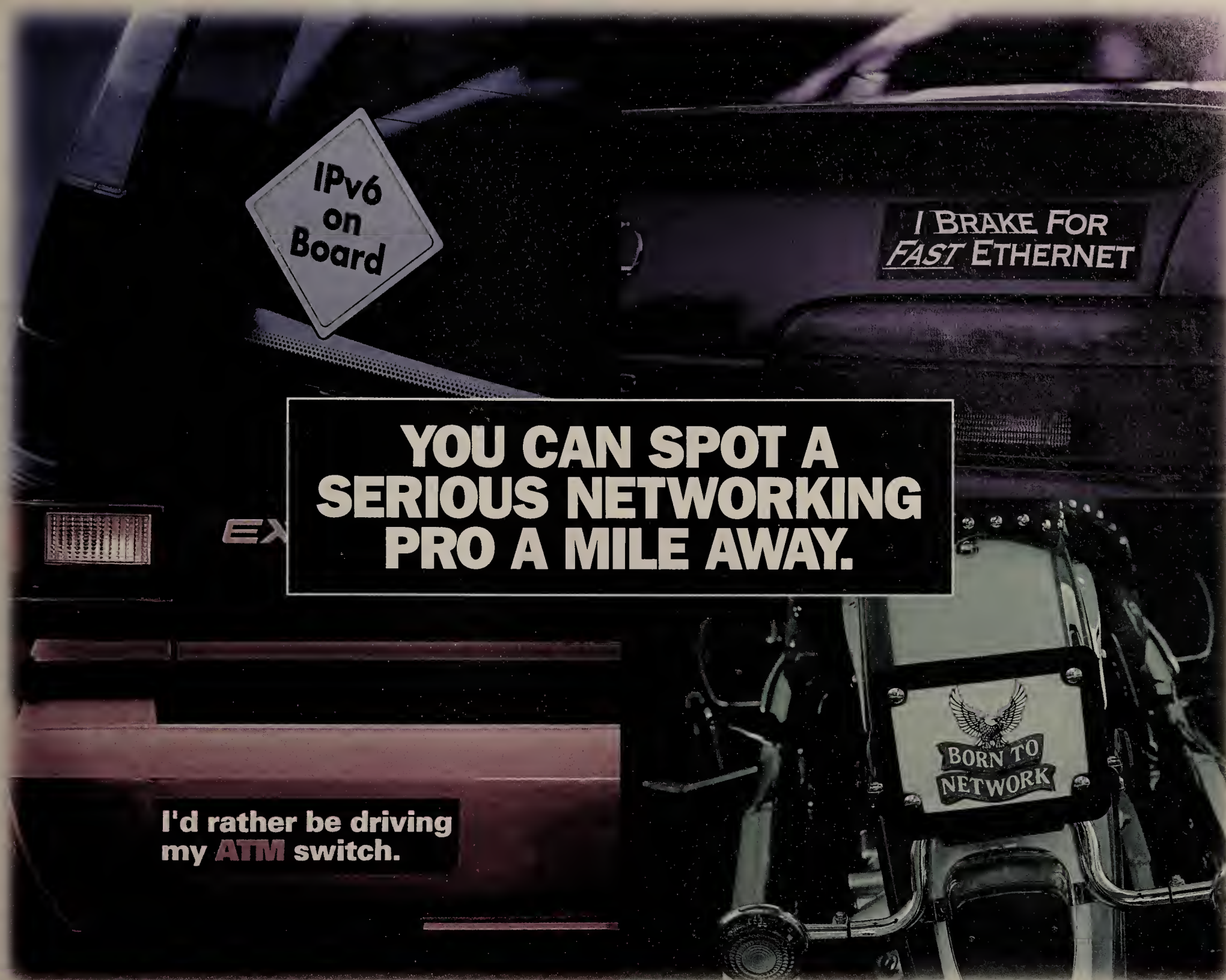
Austin Affinity XE



Our file server tests run scripts on ascending numbers of clients for four applications: Microsoft's Word and Excel for Windows, Lotus' 1-2-3 for Windows and Corel's WordPerfect for Windows. The scripts perform file-access operations such as opening, importing and saving files.

We have two application server tests. The first is a client/server database test that uses Microsoft Access on the front end and Oracle Workgroup Database 7.2 on the back end. We perform various read and write operations on a three-table payroll management application. The other is a Notes test that uses Lotus Notes Release 4.0. We access multiple views in a database, then each document within each view.

Our performance summary graphs show the results of each test in scripts per minutes, with numbers of clients ranging from one to 16. Because the tests run faster than a real client could perform the operations, each of our test clients stresses the servers as much as several real users would.



Outside the U.S. call 415-578-6900. ©1996 SOFTBANK Expos. Interop is a registered trademark of SOFTBANK Expos. NetWorld is a service mark of Novell Inc. Other names are the property of their respective holders.

When serious networking pros want to get up to speed on everything from LANs to global enterprise networks to the Internet, they floor it straight for one place: NetWorldSM+Interop[®] in Atlanta. NetWorld+Interop brings together more than 500 of the world's top vendors and thousands of the latest products. All connected via our 6000 node, multivendor, multiprotocol network proving ground—the InteropNet[™]. So you can see 100 Mb/s Ethernet technologies. Switching and routing. Internet and

intranet. Plus wireless, ATM, LAN emulation, Fibre Channel, frame relay transports, and hundreds more. Pure and simple, NetWorld+Interop is about interoperability. Whether you're integrating classical networks with cutting-edge technologies, or starting from scratch. And with 50,000 colleagues and experts on-site, you'll get even your toughest questions answered. So if you're serious about networking, save \$50 by registering free today at www.interop.com. You'll be speeding along in no time.

NETWORLD+INTEROPSM

CONFERENCE: SEPT. 16-20 • EXHIBITION: SEPT. 18-20 • GEORGIA WORLD CONGRESS CENTER • ATLANTA, GEORGIA

Save \$50 and register FREE at <http://www.interop.com> • Or call 800-488-2883



Management Strategies

Covering: Career Insights and Innovations
in Managing Staff, Budgets and Technology

Briefs

■ **CallWare Technologies, Inc.** recently opened the doors to its **Multimedia Telecommunications Institute (MTI)**, which will provide hands-on instruction on the use of computer-telephone integration products.

The MTI will be housed at 25 international training centers where resellers and end users can gain the following certifications:

- Basic and Advanced Multimedia Telecommunications Professional
- Basic and Advanced Multimedia Sales Professional
- Multimedia Telecommunications Administrator
- Multimedia Telecommunications End User
- Multimedia Telecommunications Instructor.

Course fees vary, depending on length of course and subject matter.

© CallWare: (801) 486-9922.

HP offers up Unix/Windows NT hands-on integration workshop

Users will get a chance to administer a Unix/Windows NT LAN at three-day event.

By Jim Brown

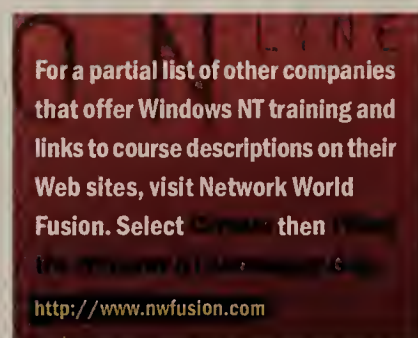
Hewlett-Packard Co.'s Professional Services Division last week announced it will provide hands-on training for users looking to mix Unix and Windows NT on the same network.

Students attending a three-day workshop being offered at HP training centers around the country will be able to discuss key integration issues, practice what they've learned and try out their own solutions, says James Morales, an HP program manager. The workshop will also give students a chance to become familiar with integrating Unix with Novell, Inc.'s NetWare.

HP will be filling an important void in the training market, says Tom Kucharvy, president of Summit Strategies, Inc., a market strategy and consulting firm in Boston. "This is the first workshop of its type that I've heard of, and getting this type of knowl-

edge is going to be absolutely critical."

Kucharvy says many companies are trying to link Windows NT servers in their departments



to the Unix-based servers operating at the enterprise level. "There is very little understanding about how to do it currently."

"HP, being a leader in providing Unix servers for the enterprise, is in the best position to do this," Kucharvy continues. Furthermore, he says HP has picked up considerable Win-

dows NT knowledge; it is one of three Microsoft-sanctioned global support providers for NT and the BackOffice suite of applications that runs on top of it.

At each workshop, HP will set up a network that includes an HP RISC-based server running HP-UX (HP's iteration of Unix) plus an HP NetServer running Windows NT or NetWare. Each student will be able to use a Windows-based client PC.

After an introduction to integrated network architectures and frameworks, students will receive an update on the latest features and future developments in Unix, Windows NT and NetWare 4.11.

The rest of the workshop is broken into seven areas: establishing interconnectivity using TCP/IP; file sharing using mostly the Network File System; enabling file transfer, X-terminal and Windows emulation

applications; network printing; creating an electronic mail infrastructure capable of supporting Microsoft Mail, Microsoft Exchange, Lotus Notes and HP OpenMail; providing database access using Microsoft's Open Database Connectivity; and creating data backup and recovery.

HP plans to hold one workshop a month and is working on customer requests to run the first workshops in Atlanta, Chicago or Toronto, Morales says. HP developed the workshop after a customer survey showed that 80 of 100 users who took an HP-led Unix systems administration class over the past 18 months plan to or already use Windows NT. Furthermore, 60 of the 100 said they will require Unix/Windows NT integration training before 1998.

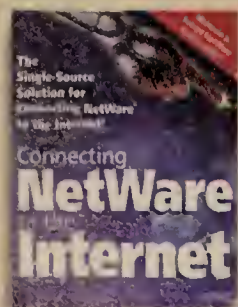
Workshop attendees must have taken a Unix network administration course or have equivalent experience, and must have experience with Windows NT, Windows 95 or Windows for Workgroups networking. Each workshop will be limited to 12 students and will carry a \$1,795 tuition fee.

© HP Professional Services Organization: (800) 472-5277.

NETWORK BOOK REPORT

Connecting NetWare to the Internet

Paul Singh, Rick Fairweather and Dan Laderman (Indianapolis: New Riders Publishing), 294 pp., \$32. Phone: (800) 653-6156; ISBN: 1-56205-398-1.



As the title suggests, this book focuses on getting Novell, Inc. NetWare LANs tied into the Internet, but there is enough general information to make it useful to any LAN administrator. On top of a lot of how-to information, the authors discuss the benefits of Internet connection and usage, along with administrative and security issues. Two case studies provide implementation guidelines. There is also a listing of Internet access providers, IP address subnetting tables and a decimal-to-binary conversion table.

The Complete Guide to NetWare 4.1

James E. Gaskin (Alameda, Calif.: Sybex, Inc.), 1,545 pp., \$49.99. Phone: (800) 227-2346; ISBN: 0-7821-1500-4.

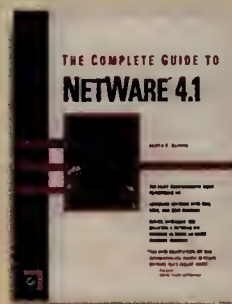
Whether you are an experienced NetWare user or a neophyte in a small or large company, this well-organized and user-friendly presentation can help you set up, fine-tune and maintain a NetWare 4.1 network. You

can also learn how to integrate with Macintosh, Unix and OS/2 systems. The "In a Hurry?" instruction lists walk you through a mix of such possible challenges as smoothing print queue snarls and selling a watertight network plan. You can follow the progress of two mythical companies and learn from their successes and mistakes. Sidebars, tips, warnings and notes scattered throughout the book provide extra networking wisdom.

The Digital Economy

Don Tapscott (New York: McGraw-Hill), 342 pp., \$24.95. Phone: (800) 722-4726; ISBN: 0-07-062200-0.

Tapscott describes the communication revolution taking place via interactive multimedia technology and the Internet as the "networking of human intelligence." Technology optimists reason that collective problem-solving and innovation will provide vast, new promise and unimaginable opportunity. Pessimists think the digital frontier is reckless, confusing, uncertain and dangerous. The book attempts to topple the wall between these two camps. It offers insight and direction for success in a new economy where business processes are changing and computing, telecommuni-



cations and entertainment are all converging.

TCP/IP for Everyone

Pete Loshin (Chestnut Hill, Mass.: AP Professional), 425 pp., \$29.95. Phone: (800) 313-1277; ISBN: 0-12-455827-5.

A curious end user or a prospective TCP/IP network engineer can get a behind-the-scenes look at the Internet in this book. There are four major sections that introduce TCP/IP internet networking; discuss major TCP/IP networking protocols; explain TCP/IP applications such as telnet, File Transfer Protocol, electronic mail and building electronic pages using HTML; and provide an overview of network implementation and management. In addition, there is a full chapter on using TCP/IP with Windows 95. A set of appendices include some Internet history, a listing of Internet organizations and a discussion of IP Version 6.



The publishers of these books offer many more networking titles. For links to their Web sites, visit Network World Fusion. <http://www.nwfusion.com>
From the main menu, select Careers then Network Book Report.

Pacific Bell has numerous opportunities for you to apply your experience in engineering — or in large-team supervision — to a career in telecommunications.

Positions are located at work centers throughout Northern and Southern California. The majority of Network Engineering positions are located in San Ramon, California.

Network Engineering Positions

Systems Engineers:

You will be responsible for studies and analysis in network architecture, requirements, testing, vendor management, and technical support. To qualify, you must be able to work with protocol specifications, computer and mathematical models, basic statistical analysis, and UNIX C. Excellent verbal and written communication skills are required. MS in either EE, OR, Mathematics or Statistics is required.

Switching and Transport Engineers:

Opportunities exist for Design, Planning, Transmission, Power, Central Office, Detail and Resident/Senior Engineers. You must have a knowledge of network architecture (SONET, DMS, 5ESS, etc.), project management, vendor management, and statistical analysis. Excellent verbal and written communication skills are essential, as is a BS in EE or CS.

Network Operations Technical Managers

You will provide expert technical assistance to our technicians as they install and maintain AT&T and Nortel product lines (5ESS, DMS100, DACS, DSC, etc.) in our switched network. You'll also interact with maintenance engineers and equipment vendors to troubleshoot complex problems escalated by the field and to direct system recovery procedures. Additional responsibilities include evaluating first company applications of new technologies. A Bachelor's degree in Computer Science, MIS, or a related technical area is preferred.

We offer competitive salaries and benefits. Please send your résumé and salary requirements to: Pacific Bell, Staffing and Employment, Dept. EM-NW2, 666 Folsom Street, Room 925, San Francisco, CA 94107. You may also fax directly to our database at (415) 243-0766. Use fine or extra fine mode if possible. We are an equal opportunity employer.

Service Operation Managers & Network Operations Supervisors

You will be managing the central office, control center and field activities of the technicians and administrators responsible for installing, provisioning, maintaining, and repairing the telecommunications services and facilities of our customers throughout California. In our Network Services and Service Operations organizations, you'll attend to the people and to the process — creating a high involvement workplace, motivating and developing your team in a union represented environment, while analyzing results and trends to manage your force and budget resources to meet the workload and business objectives. A BA/BS degree in Business, Telecommunications Systems, or a related technical area is highly desired.

A background in local exchange telephony is not required, but your competitiveness for these positions increases with your knowledge of the local loop and mechanized testing and support systems. This will enhance your ability to mentor your team, satisfy customers, lead process improvements, and resolve issues associated with providing basic and special services (ADN, Analog, Data, ISDN, HiCap, Fiber, SONET, E911) to residence and business customers, including local exchange carriers. At least 2-3 years of supervisory experience is preferred. Candidates with experience in ISDN and specially designed circuits are especially needed. A Driver's License is generally required for managers with field responsibilities (Class A for Service Operations positions).



PACIFIC * BELL®

A Pacific Telesis Company

The path to professional enlightenment is often obstructed by companies who claim to be something they're not. U.S. Robotics claims only one thing: the largest share of modems and data communication products sold in the United States. With this perfect knowledge, decisions are easier to make, leaving your mind to contemplate the many ways in which you will enjoy your success with us.

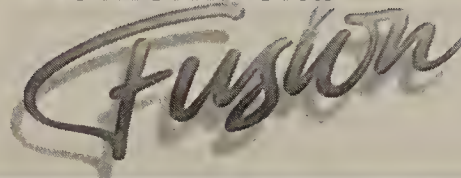
Network Engineers

Your BSEE/BSCS (or equivalent) and at least 5 years experience with UNIX Administration in a manufacturing environment is critical. C/C++, Progress Database Management and Novell knowledge required. 10 Base T network background essential including bar-code generation, scanning and data collection.

As you would expect from a leader, excellent training, relocation and compensation are all yours. Mail/fax your resume to: U.S. Robotics, Manufacturing Division, Attn: Human Resources (NW/SB - NE), 6201 W. Oakton St., Morton Grove, IL 60053. Fax: (847) 966-6671. U.S. Robotics is an equal opportunity employer rich in diversity.

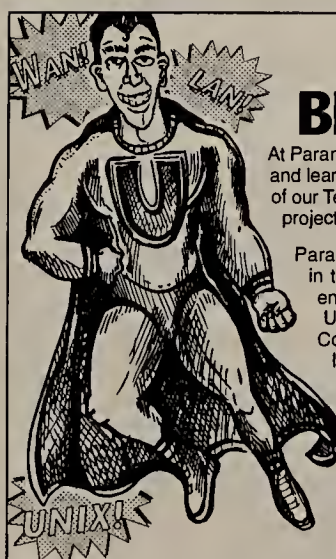
U.S. Robotics®
The Intelligent Choice in Information Access
<http://www.usr.com>

NetworkWorld



**Try Network Fusion,
Careers, for Job Listing**

<http://www.nwfusion.com>



PARANET BE AN I.S. SUPER HERO

At Paranet, YOU become one of the BEST in the business by working with, and learning from people who ARE the BEST in the business. As a member of our Technical Leadership Teams, you take part in shaping and developing projects within a unique culture of teamwork, cooperation, and growth.

Paranet is a highly successful technical services provider specializing in the management and support of large-scale distributed computer environments. We have exciting career opportunities that involve: UNIX Systems Administration; Large-scale DNS, DHCP Configuration Performance Tuning; Firewalls & Security Design and Implementation; Internet Mail & Web Server Implementation; Network Design; WAN, LAN Router Configuration & Implementation; Network Monitoring & Control Projects.

Due to our continued growth in Dallas, opportunities are available for people with experience in the following areas:

UNIX SYSTEMS ADMINISTRATORS

- HP-UX, SunOS, Solaris, AIX
- NFS, NIS, DNS, TCP/IP
- Multi-vendor Integration
- Network Management

NETWORK ANALYSTS

- Cisco, Wellfleet, 3Com Routers
- Ethernet, Token Ring, FDDI, ATM, Frame Relay
- HP Openview, SunNet Manager, Netview AIX, Net Expert, CiscoWorks, Optivity
- TCP/IP, IPX/SPX

Paranet offers you unparalleled opportunities to grow professionally, technically & personally. Of course, we also offer excellent salaries & outstanding benefits that include medical/dental/life insurance, 401(k), & career pathing in leading edge technologies.

Please visit us on the World Wide Web at: <http://www.paranet.com>

For immediate consideration, please send your resume via e-mail, fax, or mail to:

E-mail: HR@dfw.paranet.com • Fax: 214-387-2436

PARANET, Inc., Attn: MB/NW, 14651 Dallas Parkway

Suite 405, Dallas, TX 75240

WE ARE AN EQUAL OPPORTUNITY EMPLOYER



Software Consultant: Provide services to clients in design & development of business applications to support banking, inventory, financial accounting, insurance & other business related activities; design, develop & support software development life cycles with IBM VMS, OS/2, CSP, DB2, CICS, Oracle, Unify, CASE tools, UNIX & C; develop software to integrate Mini Computer based systems to IBM mainframes & convert database information from client systems to IBM environment; perform requirement studies & analysis with Information Engineering Methodology (IEF) & ADW; provide technical support to users (debugging, testing, modifying). May work at unanticipated locations in the U.S. as assigned by corporate office. \$41,000/yr. 40 hrs/wk. B.S. or equivalent in Computer Sc. or Computer Eng. & 2 yrs. exp. in job offered or 2 yrs. related exp. as Systems Analyst or Programmer Analyst to include use of IBM VMS, OS/2, CSP, DB2, CICS, Oracle, Unify, CASE tools, UNIX, C, IEF & ADW. Submit resume or apply in person to the GA Dept. of Labor 1535 Atkinson Rd Lawrenceville, GA 30243-5631, or the nearest Dept. of Labor Field Service Office. Job Order #GA 5988466.

Information Technology & Management Services

**Manage the present
from the future**



*Be part of a growing organization focused on
providing information technology solutions
to Global 2000 business clients.*



AT&T Solutions is seeking qualified individuals to staff the following positions:

Networking Management

Responsible for the predictive and preventative operation and remote management of large business client's information networks. Requires a BS in Computer Science or Information Technology, a minimum of 3-5 yrs. of networking management experience and skills in performance management, capacity planning as well as in-depth problems analysis and resolution.

Client Technical Associate

Responsible for monitoring and problem resolution of a client's Information Technology Infrastructure. Involves heavy client interaction and requires a flexible work schedule. Requires a BS in Computer Science or Information Technology and some experience/skills in one of the following: LAN, Data, Voice, Router, Desktop, Server.

Client Technical Professional

Responsible for supporting a technical team in the remote management of a client's Information Technology and 3-5 yrs. operational experience in Network, Premise Equipment, and/or Client/Server Management. Exceptional interpersonal, leadership, and management skills are essential.

For consideration, please send resume to:

AT&T Solutions
Recruiting
Room 1S148
15 Vreeland Road
Florham Park, NJ 07932

An equal opportunity employer

**free free
free free
free free**

<http://www.nwfusion.com>

If you are interested in management strategies, career information and job listings, visit the Networking Careers section of Network World Fusion at the above address.

Network World's new Web offering Network World Fusion is the most comprehensive and educational advertising environment on the WWW. Recruitment print ads will be placed on **Network World Fusion for 4 weeks - free.**

Advertisers who would like

more information on the Network

World Fusion options should call

Pam Valentinas @ 800-622-1108

***Our team of innovative, hard-hitting
professionals has created new,
exciting opportunities for you.***

In the rapidly-evolving world of data communications, the professionals at Computer Power Group have continued to provide our clients with innovative, state-of-the-art services and solutions. For nearly a decade, we have been guiding our clients through the complexities of internetworking. In this process, we have achieved impressive growth and a solid record of measurable accomplishments.

Now, Computer Power is joining forces with Interim Services, Inc., a \$1.4 billion company, to play a key leadership role in information technology consulting. With this combined experience of over 75 years, our strength to serve our clients will continue to come from our simple company philosophy - to create and deliver unique service offerings to meet our clients' needs. We will continue to honor this commitment as we look forward to phenomenal growth into the 21st century. That's why we are offering the following outstanding employment opportunities in our Chicago Branch:

NETWORK ARCHITECTURE/DESIGN

ENGINEER Strong background with large, multi-protocol, multi-platform networks; solid understanding of configuration/operations of networking hardware; WAN (Routers, Bridges, Gateways); SNMP (HP-Openview, SunNet Manager, Cisco Works); Internetworking; Protocol Analyzers; FDDI; Frame Relay.

UNIX/NT SYSTEMS ENGINEER Strong background with large TCP/IP networks; UNIX/NT Administration (HP-UX, Solaris, AIX, SunOS, NT/AS); solid understanding of NFS, NIS, DNS, SMTP, SNA; Web Server and Internet connectivity experience is a plus.

VOICE/DATA NETWORK ENGINEER Strong background in large voice/data networks; experience with Analog/Digital services, pbx, voice

mail, video conferencing, traffic analyzers, telecommunication carriers and tariffs; ISDN; ATM; X.25; SNMP.

INTERNET SPECIALIST Solid background in Internet connectivity; strong knowledge of Firewalls/Internet Security; experience with Web Server implementation/management, router configuration, Service Providers and POPs; UNIX, NT, TCP/IP, SMTP, DNS, FTP, NFS, ISDN, HTML.

MESSAGING SYSTEMS SPECIALIST Strong background in the design, implementation, and management of large multi-site e-mail systems; experience with messaging, group calendaring, electronic forms, desktop video conferencing, voice mail integration, and groupware (Lotus Notes, GroupWise); EDI, SMTP, MAPI, X.400, MHS, NetWare Global Messaging.

Interim Technology provides an excellent salary, comprehensive benefits, 401(k), and tremendous opportunities for advancement. Contact our Staffing Specialists: (708) 574-3030, Interim Technology, Dept. NW, 823 Commerce Drive, Oak Brook, IL 60521. Fax: (708) 574-3076. EOE.

Interim
TECHNOLOGY
FORMERLY COMPUTER POWER GROUP

**For More Information on Advertising
in Networking Careers**

Contact Pam Valentinas

1-800-622-1108



JOIN A WORLD LEADER.

PageNet is the world's largest messaging services company with over 7 million pagers in service, and we're still growing faster than the competition. We have an unparalleled international digital network and a history of exceptional financial performance.

At our Plano headquarters, our teams of systems professionals and engineers are shaping the wireless communications industry using the latest in client server information systems and networking technology. Telecommunications is the recognized growth industry for the 21st century, and we are currently looking for individuals with the following backgrounds to help us share in that growth.

CAPACITY PLANNING MANAGER

Selected individual will have 2-4 years of experience in telecommunications engineering with experience at calculating capacity and recommending optimization and very strong mathematical skills. Experience in calculating or modeling wireless capacity is preferred.

ASSOCIATE NETWORK DESIGN ANALYST

Requirements include: 2+ years experience in device and/or network troubleshooting, understanding of networking and associated devices (i.e. routers, modems, hubs, etc.), ability to use PC tools, excellent documentation skills, and customer service orientation. Experience using an engineering drawing package preferred, but not required.

NETWORK DESIGN ENGINEER

Ideal candidate will have: strong background in UNIX administration/programming; general LAN/WAN administration and design experience; understanding of MIBS and RMON; experience with HPOpenview, Sun Net Manager, Cisco Works, and distributed sniffers.

If you want to be part of building an industry leader while working with the latest technologies, please forward your resume to: **Technical Recruiter, Paging Network, Inc., 4965 Preston Park Blvd., Plano, TX 75093. FAX: 214/985-6561, e-mail employment@pagenet.com. EOE.**

Visit our Web site -www.pagenet.com

PAGENET[®]

IN TOUCH AND INGENIOUSSM

Software Consultant: Provide services to clients in design & development of software applications & systems using the IBM AS/400 system with SQL/400; RPG/400, CL/400, Query/400, SDA/400, RLU/400, & IPG/400 Case tools; design & develop tracking systems to support client information with MS-Access & MS-Windows; maintain & test voice-mail & fax-on-demand systems using PRISM in a MS-DOS environment; develop interface tools, implement & network applications across AS/400 & Unix platforms; develop screens & module prototypes with LISPL; generate reports, make needed modifications; prepare technical specifications & fine tune system to ensure performance criteria; provide technical support to users. \$39,175/yr. 40 hrs/wk. B.S. or equivalent in Computer Sc., Computer Eng. or Computer/Electrical Eng. & 2 yrs. exp. in job offered or 2 yrs. related exp. as Systems Consultant, Systems Analyst, or Research Assistant in computer environment. 2 yrs. exp. may be combination of listed positions. Exp. in related occupations must include use of AS/400, SQL/400, RPG/400, CL/400, Query/400, SDA/400, RLU/400, IPG/400 Case tool, Unix, LISPL, & PRISM. Job Location: Chattanooga. Submit resume to Charles Turner, Dept. of Employment Security, P.O. Box 11088, 311 MLK Blvd., Chattanooga, TN 37401 ATTN: J.O. #TN6200226.

Network Services Opportunities

The Company

GE Network Services, a unit of GE Capital Technology Management Services, provides comprehensive network services which help our customers manage their technology assets and reduce their cost of ownership. Our Network Consulting Group supports all pre-sale efforts with technical presentations, opportunity assessments, bid/proposal development, performance analysis, and network/implementation planning. We currently have opportunities available nationwide.

Network Implementation Managers

Qualified individuals will possess 5+ years' experience in the network industry, understanding of distributed network technology (Network Operating Systems, Standard Topologies & Protocol Suites, Client Software, Mail Systems, Data Bases, Hubs and Switches, Routers, WAN/CPE, Premise Distribution, Logical Designs, and Network Management), demonstrated ability to balance resources while maintaining flexibility and quality as well as ability to manage customer satisfaction and resolve critical issues, and excellent communication and interpersonal skills.

Program Managers

Network Consultants

Contact and Benefits

We offer a competitive salary and excellent benefits package. For confidential consideration, please send, fax or e-mail resume, indicating position of interest on envelope and resume, to: **Fred Palarto, GE Technology Management Services, Dept. NW, 6875 Jimmy Carter Blvd., Suite 3200, Norcross, GA 30071; FAX: (770) 246-6439; E-mail: gectms.fpalarto@capital.ge.com** (ASCII text format only!). No phone calls or agencies, please! Due to response volume, we are unable to acknowledge each inquiry.



GE Capital
Technology Management Services

An Equal Opportunity Employer.

BUILD ON OUR COMPETITIVE ADVANTAGE!

GST Internet, Inc. is the newest West Coast provider of internet services. As part of GST Internet, you'll have the opportunity to grow with a group of highly talented, energetic people in an exciting new business start-up. The following positions are available in Network Operations. We're seeking candidates who are willing to travel and possess a Bachelor's degree and 2+ years' related experience.

NETWORK BACKBONE MANAGER

You will design/engineer the extension of ISP Wide-Area Network serving the Western U.S., and integrate ISP Network functionality with ATM/Frame-Relay switching layer. Additionally, design and manage peering arrangements with other ISPs, as well as specify, implement and manage POP facilities and backbone communications links. **Job Code: 517**

NETWORK OPERATIONS CENTER MANAGER

The successful candidate will implement/manage network management and monitoring platforms, and implement configuration management and change control systems. In addition, you will manage internal business system platforms and implement ISP-level control systems for address allocation, DNS, e-mail, etc. **Job Code: 516**

CUSTOMER INTERFACING MANAGER

Integrate GST customer premises equipment (Cisco/Nortel Passport) and ISP functionality (IP, DNS, routing, web hosting) with customer networks. You'll also troubleshoot customer connectivity to POPS and implement/manage dial-up services. **Job Code: 507**

HELP DESK/CUSTOMER SERVICE MANAGER

In this position, you will manage our customer service group and our intelligent help desk environment. Includes managing customer follow-up and issue resolutions. **Job Code: 506**

GST offers competitive salaries and a complete benefits package. For immediate consideration, please send your resume to: GST Internet, Inc., Attn: Human Resources/(Job Code), 421 SW Sixth Ave., Suite 1100, Portland, OR 97204-1614; fax to: (503) 223-2006; or e-mail to: **resume@gstnet.net** (include Job Code). GST is an equal opportunity employer.



**Your Ad
Could Be
Here For
\$320.00**

Help Wanted: SYSTEM HARDWARE ENGINEER
Responsible for development of transmitter and receiver front end hardware for advanced communication network systems. A working understanding of antennae, LAN, power amplifiers, high frequency board layout techniques, electronics, signal processing, 8 and 16-bit microprocessors, and Assembly Language/C and UNIX system is required. Must have M.S. or equivalent degree in Elect. Engr. or Experimental Physics. Candidates must be presently eligible for permanent employment in the U.S.; an employer paid ad. Salary: \$2,750 per mo.; 40 hrs/wk. Send resume and 2 letters of recommendation to: Mrs. J. Gaston, Division of Employment Security, P.O. Box 339, Florissant, MO 63032; refer to JON: 383406

NORTHWESTNET

NorthWestNet, the premier provider of Internet connectivity and information services in the Northwest US since 1987, seeks the following networking professionals. NorthWestNet provides highly reliable, high capacity Internet connectivity and WWW to over 100 leading corporations and institutions, including Microsoft, Boeing, Starwave, and Nike. Rapid corporate growth provides for exceptional professional opportunities and aggressive compensation packages, including competitive salaries, performance bonuses, and stock options.

NETWORK ENGINEERS

These engineers are responsible for designing and deploying our WAN spanning several states and interconnected with several NSPs. Candidates should have expert knowledge of TCP/IP routing protocols (e.g., OSPF, BGP, PIM), and WAN topology design including Frame Relay, T1, and T3 telecommunications services. Experience with Cisco IOS, UNIX, and limited shell programming is also required. BS/MS in CS or EE is a plus.

SECURITY ENGINEER

A senior Internet Security Engineer will lead product development and assist building an engineering team capable of delivering a suite of Internet security services to our clients; including on-site security audits, incident response services, transport and application-layer filtering products, encryption technologies, and other related security consulting services. A demonstrated history of IP Security, C and UNIX experience is desired.

To apply, please send cover letter, resume, and list of three references to search@nwnet.net or to:

NORTHWESTNET TS SEARCH

15400 SE 30th Place, Suite 202, Bellevue, WA 98007.
or via fax at (206) 649-7451. Additional information is available at
<http://www.nwnet.net/company/company-jobs/>

FAX YOUR COPY.....

It's easy to place your Recruitment Ad in the Networking Careers Section. Just fax your copy to us at **508-820-0607** and we will typeset it for you at different sizes & prices. No obligation of course.

When we fax it back to you, just call us with your changes and suggestions.

We look forward to working with you.

.....**TO 508-820-0607**



Pondering the fantastic is the birth of new technologies.

Products don't just appear. They begin with wondering, "what if..." GI Communications, a division of General Instrument Corporation, leads the industry in technologies for broadband communications by encouraging individuals and teams to explore possibilities. Cable. Satellite. Terrestrial broadcasting. Come to GI Communications and experience the future, today.

Programmer/Analyst

Bring at least one year of programming experience to include SQL, Procedural Language, and Unix, as well as a background with a major data base (preferably Oracle) and Windows applications (MS Excel, Word, Power Point, Project, Access, VB). You'll help identify and solve both process and software oriented problems.

Network Management Software Engineer

Bring experience with C++, and structured software development processes. Perform object-oriented software design, code development/test, and integration. HP Openview or a similar network management development package is highly desired.

End User Support Analyst

Bring at least two years' end user support or equivalent experience to include installing and trouble-shooting hardware and software (Windows for Workgroups,

MS Word, Excel and Powerpoint). A general working knowledge of TCP/IP, Novell, Network topologies, Microsoft NT workstations, UNIX, NFS, DNS, and Microsoft or internet mail is highly beneficial.

Systems Administrator

Bring at least three years' experience with SunOS version 4.x thru Solaris 2.x, as well as HP UX 9.x, Windows NT Server administration, and PC desktop/applications support. A background providing support in an engineering environment is important and in-depth knowledge of TCP/IP based protocols (ie. NFS, RPC, NIS, DNS) is necessary. Experience in a problem solving team environment with a focus on networks and distributed computing applications is preferred.

Here's how to apply.

In Hatboro, PA, an attractive suburb of Philadelphia, General Instrument offers highly competitive salaries and comprehensive benefits. Learn more about our division on the World Wide Web at: <http://www.gi.com>

For consideration, please send your resume to: GI Communications Division, General Instrument Corporation, Lisa Evoli, Human Resources Department, P.O. Box 506, Mount Laurel, NJ 08054. An Equal Opportunity Employer.

GI General Instrument

<http://www.nwfusion.com>

Go to the Careers section on Network World Fusion at the above address. Four past weeks of Networking Careers can be found under Job listing.

COMMUNICATIONS ARCHITECT

FOR EMERGING COMPANY

Our client, located in New England, has an opportunity available in an unusual start-up situation with an inherited revenue stream. They are expecting to emerge as an industry leader in the remote access market. The right individual will play a significant role in conceptualizing and defining technically advanced state-of-the-art high performance remote access and internetworking equipment. Qualified candidates must possess superior technical knowledge of advanced communications, an understanding of the competitive framework for remote access, internetworking and switching products, and demonstrated leadership skills.

Interested candidates please send resume to:
B5225, 161 Worcester Road, Framingham,
MA 01701.

APOGEE Marketing Group, Inc.

SALES & TECHNICAL TRAINERS

APOGEE Marketing Group, Inc. is seeking experienced Sales and Technical Trainers nationwide to deliver LAN/WAN and data communications courseware. Successful Technical Trainer candidates will have strong technical skills and experience working with LAN/WAN and data communications products. Successful Sales Trainer candidates will have a sales background, strong conceptual skills and experience working with LAN/WAN and data communications products. Trainers are required to publish course schedules, set up training facilities and score certification tests on a weekly basis. Candidates with training, system engineering or strong customer support background will be considered.

Please fax your resume to 312-906-8184
or E-mail it to bernard9@starnetinc.com

WE'RE CREATING A TEAM to develop & implement a new system

Health Systems International, Inc., a leading managed care company, is creating a Development Project Team. We're developing and implementing a fully integrated managed care information system to support our new generation of medical management. Currently, we seek experienced professionals for the following opportunities in Colorado.

CLIENT/SERVER - GUI DEVELOPMENT

- PROJECT MANAGER
- SR. PROGRAMMER/ANALYST C++
- PROGRAMMER/ANALYST C++
- ORACLE DBA
- BUSINESS ANALYST
- NURSE ANALYST
- CLINICAL BUSINESS ANALYST

SYSTEMS INTEGRATION

- UNIX SPECIALIST
- ARTIFICIAL INTELLIGENCE SPECIALIST
- INTEGRATION SPECIALIST
- NETWORK SUPPORT TECHNICIAN

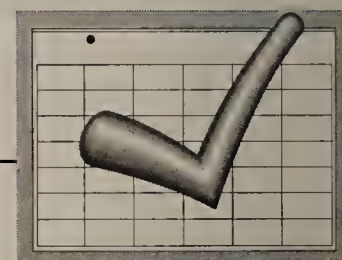
SYSTEM IMPLEMENTATION

- IMPLEMENTATION MANAGER
- IMPLEMENTATION LEADS
- SYSTEM TRAINER

In our scenic Pueblo site, located just two hours outside of Denver, you'll enjoy exciting recreational activities and a close-knit community.

For confidential consideration, please contact Paula Martinez at (800) 628-2287 or send resume to her attention at: Health Systems International, Inc., 225 N. Main Street, Pueblo, CO 81003. EOE.

**HEALTH SYSTEMS
INTERNATIONAL, INC.**
(QUALMED, INC./HEALTH NET)



Mark your calendars
for these important
Features coming soon.

Issue	Special Feature	Ad Close
7/8	ATM: from LAN to WAN Special Focus: Applications	6/26
7/15	Buyer's Guide: High-end Routers Special Focus: LAN:Token Ring Switching	7/3
7/22	Tests/Reviews: Server Review Series	7/10
7/29	Tests/Reviews: Frame Relay Services Special Focus: WAN	7/17
8/5	Buyer's Guide: LAN Management Suites Special Focus: Applications Ready to Roll: Quarterly Product Status Update	7/24
8/12	Bonus Distribution: NetworkWorld Managing Enterprise Networks, Boston Tests/Reviews: High-end Routers Special Focus: LAN	7/31
8/19	Tests/Reviews: Server Review Series	8/7
8/26	Buyer's Guide: Low-end Routers Special Focus: WAN	8/14

For more information or to place
an advertisement, please call
Pam Valentinas at 1-800-622-1108.

AVALAN Introduces...

Remote Control for NT!

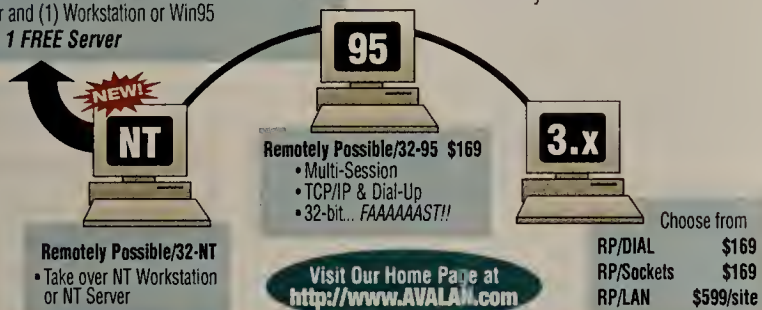
REMOTELY POSSIBLE/32-NT

or More!
Be in Two Places at Once!

Works over the
INTERNET!

- Control NT Workstation and NT Server from either Windows 95 or NT platforms
- Multi-Tasking Allows Simultaneous Remote Control, File Transfer, Keyboard Chat & "Passive Monitoring" for Offsite to Office, Help Desk, Training, Customer Support & Network Management
- Fast Performance over Winsock TCP/IP & IPX on LANs, WANs or via PPP, SLIP & RAS
- Multi-Tasking lets you take over multiple PCs simultaneously
- New Features — drag 'n' drop, long filename, logging, Host call-out, data encryption, enhanced security and MORE!

Remotely Possible/32-NT Starter Packs
Workstation Pack RP/32-NT-SA1F\$199
 (2) Workstations or Win95
BONUS: 1 FREE Workstation
Server Pack RP/32-NT-DA2F\$399
 (1) Server and (1) Workstation or Win95
BONUS: 1 FREE Server



Call TODAY to Place Your Order!

AVALAN
TECHNOLOGY

1-800-441-2281

P.O. Box 6888, Holliston, MA 01746 • HTTP://WWW.AVALAN.COM (508) 429-6482 • FAX (508) 429-3179 • e-mail AVALAN@AVALAN.COM

Reader Service No. 276

Marketplace

The Hub of the Network Buy

Free Product Information

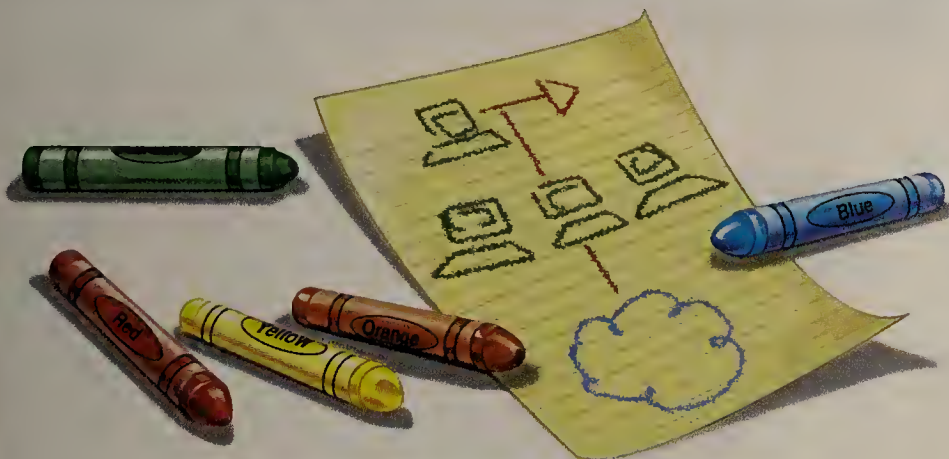
To receive more information circle the reader service numbers of products that interest you.

Send this coupon to: Network World P.O. Box 5090, Pittsfield, MA 01203 or Fax (413) 637-4343, or use the prepaid card elsewhere in the issue.

Expires 9/30/96

Name:	217	218	219	220	221	222	223
	224	225	226	227	228	229	230
Title:	231	232	233	234	235	236	237
	238	239	240	241	242	243	244
Company:	245	246	247	248	249	250	251
	252	253	254	255	256	257	258
Phone: ()	259	260	261	262	263	264	265
	266	267	268	269	270	271	272
Street:	273	274	275	276	277	278	279
	280	281	282	283	284	285	286
City:	287	288	289	290	291	292	293
	294	295	296	297	298	299	300
State:	301	302	303	304	305	306	307
Zip:	308	309	310	311	312	313	314

6/24/96



Compared to NetSuite,
network drawing tools are child's play.



Forget those dumb drawing tools. NetSuite Professional Design is so intelligent, it understands network devices and protocols, floor plans and every other aspect of your physical network. It actually tells you if your devices are compatible, if you have the port capacity you need, and much more. You can even share your NetSuite designs over the Internet for fast and easy review by authorized staff and contractors. NetSuite saves you hours every time you move, add, or change network components.

- ▶ Validates designs in real-time
- ▶ Identifies media mismatches, insufficient capacity and other problems
- ▶ Generates work orders and bills of materials
- ▶ "Device Wizard" proposes devices based on your criteria
- ▶ Includes library with thousands of LAN/WAN device models from over 75 vendors

**BEST OF
LAN TIMES
1996**

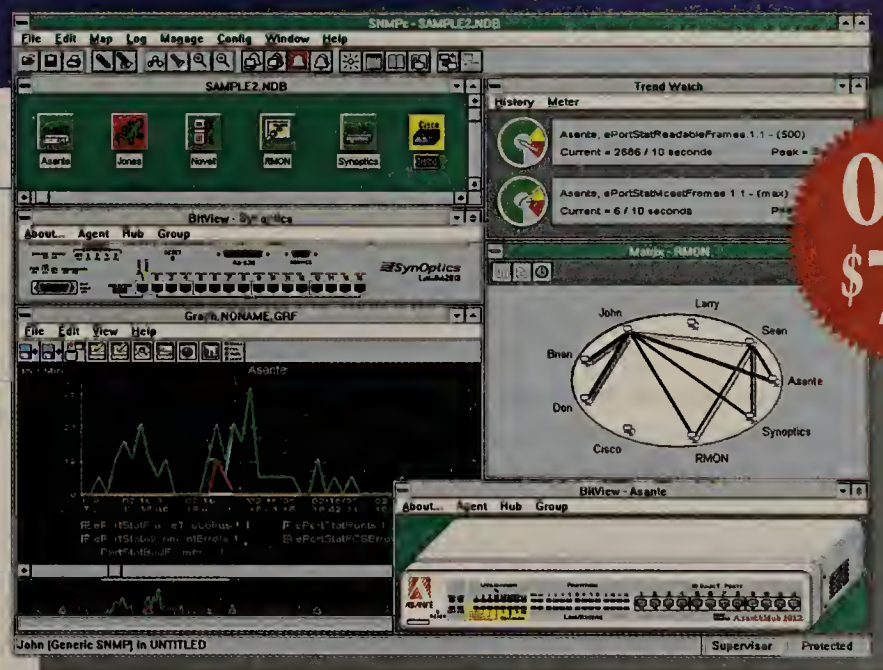
Save \$200 — order now for just \$795! NetSuite Professional Design runs under Windows 3.1, 95 and NT. And it comes with a money-back guarantee! You can't lose. Why play around with anything less.



Call 1-800-NetSuite (1-800-638-7848)
321 Commonwealth Road, Wayland, MA 01778 • <http://www.netsuite.com>

SNMPC

Network Manager for Windows



**Only
\$795**

- Full RMON Support
- Integrates with HP OpenView
- TCP/IP, Telnet, TFTP, BOOTP
- WinSNMP/WinSock/DDE APIs
- SNMP, ICMP, IPX Polling

- Node Discovery
- Long Term Statistics/Thresholds
- Custom Event Actions/Forwarding
- Over 100 Device Specific GUIs
- MIB Compiler/Browser

**Castle Rock
Computing**

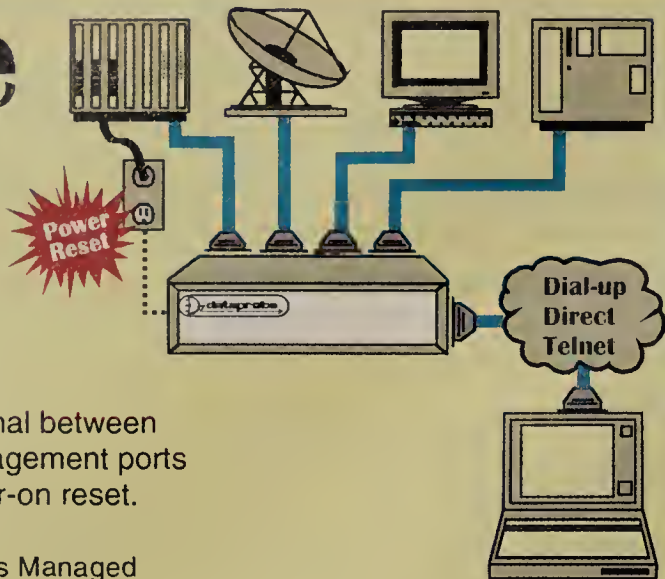
408-366-6540
Fax: 408-252-2379

Reader Service No. 252

Take Control of Remote Site Costs

Save

Modems
Line Costs
Terminals
Trips



Switch one terminal between out-of-band management ports and control power-on reset.

- 4 to 64 Devices Managed
- Remote Power Reset Control
- Alarm Monitoring and Reporting
- Remote Fallback Switching
- Simple Switching Commands with Positive Feedback



When Every Bit Counts

11 Park Place / Paramus, NJ 07652 USA
201.967.9300 Fax: 201.967.9090
Email: sales@dataprobe.com
Web Site: <http://www.dataprobe.com>

Reader Service No. 285

Is Your Encryption System Just A High Tech Museum Piece?



ISOLATION SYSTEMS'
PACKET ENCRYPTION PRODUCTS

Security is paramount. When it's your job to guarantee the safe transit of data across Wide Area Networks, the ISOLATION SYSTEMS' PACKET ENCRYPTION family of products is secure technology at its best.

Relics are nice to look at, but would you entrust the protection of your company's data to a petrified rock?

Call Toll Free 1-800-387-8706
for more information.



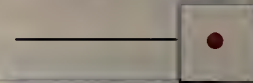
THE ISPE FEATURES:

- Multiple Protocols
- Secure Data Transmission
- DES, Triple-pass DES, NATO-specific and other proprietary algorithms
- Support for secure virtual networks
- Router Independent



26 Six Point Road,
Etobicoke, Ontario,
Canada M8Z 2W9
Tel. (416) 231-1248
Fax. (416) 231-8561
www.isolation.com

ISOLATION
SYSTEMS



Reader Service No. 262

FDDIMeter 3600 RMON LAN Monitor Special Offer \$6,995

Product Description

Technically Elite's FDDIMeter 3600 is a powerful, high-performance FDDI/CDDI monitoring probe for proactive network monitoring that collects valuable statistics and trend data on any FDDI ring or concentrator.

Out-of-Band Over Another LAN

The FDDIMeter opens the door to RMON monitoring from alternate network sources (i.e., Ethernet or Token Ring). One port monitors the FDDI network in a listen-only mode, and the other interface reports statistics via Ethernet or Token Ring. In this configuration, The FDDIMeter is monitoring both the FDDI and the management network concurrently. This eliminates any problems that may arise from loading the FDDI ring with extra SNMP management traffic, a unique feature of the FDDIMeter. Fully supports RFCs 1757 and 1513, the RMON Standard for Remote Monitoring.

Features

- High-performance RISC processor
- Additional Ethernet or Token Ring reporting port available
- SAS or DAS support
- Fiber or copper support
- SC-Type to MIC Duplex cable converter available

Supported Management Platforms

- IBM NetView
- HP OpenView
- SunNet Manager on Sun Solaris or SunOS
- DEC UNIX POLYCENTER NetView
- Cabletron SPECTRUM
- Applications also run standalone

Integrates with MeterWare for Windows and Windows 95/NT; six UNIX platforms supported
90-Day Introductory Offer

1.800.474.7888

<http://www.tecelite.com> e-mail: sales@tecelite.com

Recommended list \$8,495 for a single attached station unit with 9MB of memory. Offer expires July 1, 1996. All trademarks and trade names are the property of their respective holders.



Technically Elite

monitoring your enterprise

Reader Service No. 247



To get a One-Stop Intranet Solution, You've got to press the right buttons.

1-800-929-3054



New Intranet Genie is the simple solution for developing and managing an Intranet. It provides all the client and server applications, a universal administration interface, and advanced search capabilities for connecting to all your independent databases. Now building and managing an Intranet has never been

more affordable or easy. Frontier Technologies provides the solution to your communications needs in one comprehensive product. The Setup Wizards, tutorials and backend applications make installation as easy as 1,2,3. Call Frontier Technologies now for more information about Intranet Genie.

The One-Stop Intranet Solution.

email info@frontiertech.com <http://www.frontiertech.com> [ftp.frontiertech.com](ftp://www.frontiertech.com)



T1 MADE EASY AND AFFORDABLE!

THE PERFECT INTELLIGENT CHANNEL BANK SOLUTION:
TWICE THE T1 NETWORK FUNCTIONALITY. ABOUT HALF THE PRICE.

Perfect for Internet
Service Applications

Reduces Telephone
Line Costs

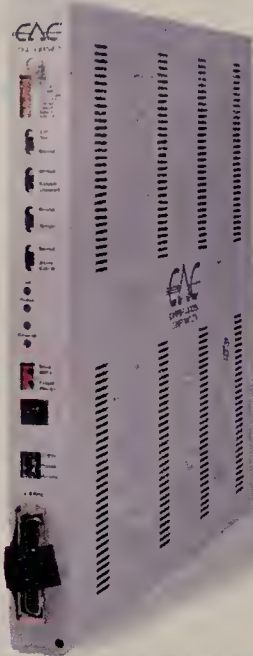
Connects to
Analog/Digital PBXs

Links Remote Key
Systems and Off-
Premise Extensions

Compatible With
All Carrier Services

Please call for pricing and
distributor information.

Carrier Access Corporation
5395 Pearl Parkway
Boulder, Colorado 80301



28.8 Kbps
Modem
Compatibility

Remote
Monitoring
and Control

High
Reliability/
No Fuses

Integrated CSU

Complete With
AC and DC
Power

FCC, UL and
CSA Approved

1-800-495-5455

**CARRIER ACCESS™
CORPORATION**

"Connecting Customers to Carriers"

Reader Service No. 251

Would you believe a SPARC™ 10 Mod 30 for only \$595?

*Rave Computer, the exclusive distributor of Weitek's
SPARC POWER uP Chip has drastically reduced prices!*

SPARCstation™ 10
performance!



SPARCstation™ 2,
IPX® upgrade

Weitek's 80MHz SPARC POWER™ uP Chip:

100% compatible with all versions of Solaris®, easy to install,
SunService warranty, twice your SPARCstation processing power.

Easy to Install • Upgrades • Trade-ins
Quantity discounts available!

Rave Computer Association, Inc.

36960 Metro Court • Sterling Heights, MI 48312

Fax: (810) 939-7431 • E-Mail: info@rave.com

Internet: http://www.rave.net

1-800-966-7283



WEITEK

Reader Service No. 302

WIRE-SPEED 10 TO 155 MBPS

Freespace™

FreespaceTurbo™

FreespaceLite™



WINNER

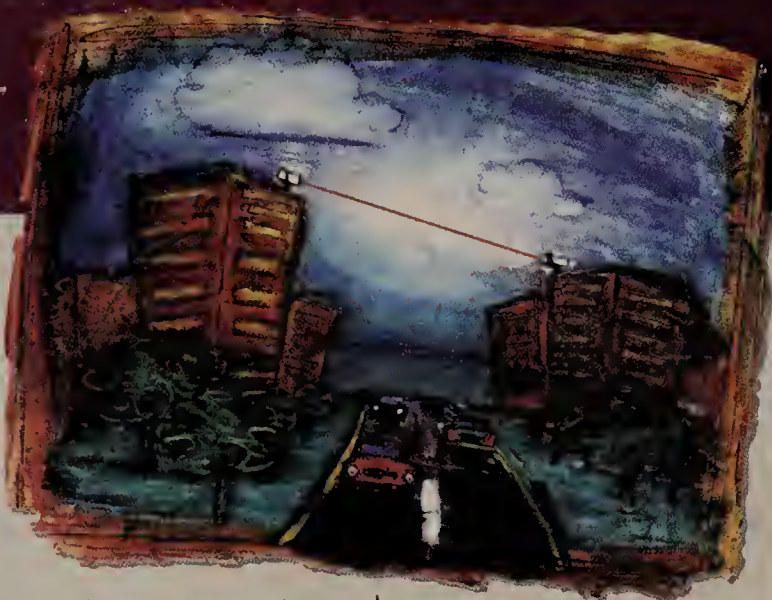
Best
Communications
LAN Times

BEST

OF SHOW

1995

ATLANTA



The award-winning Freespace laser link delivers wire-speed building-to-building connectivity at distances up to 1000ft. (300 meters). Cost-effective and easily installed, Freespace bridges the gap when traditional solutions like fiber are unavailable – and T-1 lines just aren't fast enough.

The Freespace family includes:

- Freespace Turbo for ATM, FDDI, and Fast Ethernet connections.
- FreespaceLite for an economical Ethernet link.

- A multiplexed Freespace solution integrating Ethernet with up to 4 T-1 voice lines.

Designed for all weather conditions, Freespace is your interbuilding solution for short-range, wire-speed connectivity.

Call us, fax us, or visit us at

<http://www.silcomtech.com>



North America 1-800-388-3807

Tel: (905) 238-8822 Fax: (905) 238-4976

Reader Service No. 269

Ethernet Switching

JUST THE FACTS:

3Com LinkSwitch™

- 100 Mbps between switch and server
- Up to 10 Mbps for each network user...
Not shared, EACH
- Plug and play simplicity
- Low cost
- Fault-tolerant and manageable

WHERE TO CALL:

1-800-4-MAXNET

MAXNET Offers Expert Network Services:

- Network Baseline and Analysis
- Vendor-Independent Network Design
- 24 x 7 Help Desk
- Remote Network Monitoring

Call for our free white paper on VLAN management.

MAXNET™
communication systems, inc.

www.4maxnet.com

3Com™
net Working
Partners

Copyright 1996 MAXNET Communication Systems, Inc.

Reader Service No. 267

100 Mbps Fast Ethernet and Ethernet Switches

Special Promotional Bundle

Intel WorkGroup Solution

One Intel Switching Hub (ES100TX)
Three Intel Twelve-Port Stackable Hub (EC100TX)
Thirty Intel 10/100 32-Bit PCI Adapters (PILA8465B)
Total Cost for Bundle\$9,795 (Expires 6/30/96)

10/100 Ethernet Switches

INTEL

Express Switching Hub, Five Switched
100Base-TX Ports (ES100TX)\$3,690



BAY NETWORKS Bay Network Lattis Switch System Fast Ethernet Switching Hubs

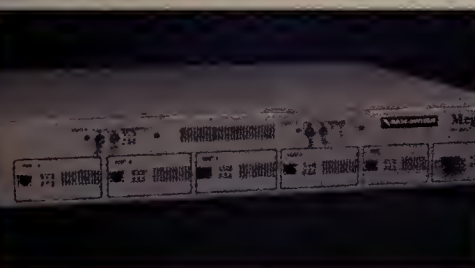
10/100 Mbps UTP Switch, 16 RJ45 Supports
10/100 Mbps Ethernet, Mode (28115)\$12,360



100Mbps Fiber Optic Switching Hub
(28104)\$14,950

NBASE

MegaSwitch FO
Five 100Base-FX Ports (NH2007FO).....\$6,455
New MegaSwitch, Five 100Base-TX Ports,
Plus Two Expansion Slots for 100Base-TX/FX
(NH2007).....\$4,450



MegaSwitch Six AUI/RJ45 Ports, Pre-Configured
with One 100Base-TX Port NH200MP, and SNMP
(NH208-10)\$3,695
MegaSwitch Six AUI/RJ45, Plus Seven
RJ45 Ports, Pre-Configured with One
100Base-TX Port NH200MP, and SNMP
(NH215-10)\$5,863



100 Base-TX MegaPort Module for NH208/215
(NH200MP).....\$1,129

CISCO SYSTEMS

PROStack EtherSwitch Stackable Ethernet Switch,
Sixteen RJ45, Two Expansion Slots for High-Speed
Modules, 100Base-TX/ATM (CPW1601A)\$3,935
(CPW1601B)\$4,582
100Base-T module for PRO16, 1 RJ45
(CPW100T).....\$972
EtherSwitch 1200, Twenty-Five 10Base-T Ports,
Two 100Base-TX, 1K MAC (CPW1200).....\$5,359
EtherSwitch 1400, Twenty-Five 10Base-T,
Two Slots 8K MAC (CPW1402)\$5,740
One-Port 100Base-TX Module (CPW1411-X)\$686
Eight-Port 100BaseTX Module (CPW1418-X)\$1,695

3COM

LinkSwitch 1000, Twenty-Four Switched
10Mbps Port, One 100 Base-TX Fast Port
(3C16900)\$3,445
LinkSwitch 1000, Twelve Switched 10Mbps Ports, One
100Base-TX Fast Port(3C16901)\$2,645



LinkSwitch 3000, Five Switched Fiber SC
100Base-FX Ports, One Switched copper 100Base-TX
Port (3C16940)\$7,525
LinkSwitch 3000, Eight Switched
100Base-TX Ports (3C16941)\$5,575

ASANTE

Fast 10/100 Bridge, Integrate 100Mbps Fast
Ethernet to Existing 10Mbps Ethernet\$969
Ready Switch Four 10Base-T Ports, One 100Base-TX
Port with SNMP.....\$2,049

100 Mbps Fast Ethernet Adapters

INTEL

Ether Express PRO/100 32-bit (PILA8465).....\$159
Ether Express 10/100 PCI (PILA8465B)
Single/SPK/20PK\$132/580/1995
Ether Express PRO/100 32-bit EISA (EILA8265).....\$235



New Intel Smart 100 Nitro High Performance Server
Adapter(PILA8485)\$715

3COM

10/100 PCI (3C595TX)
Single/SPK.....\$169/754
10/100 EISA (3C597-TX)Single/SPK.....\$251/1228

COGENT

PCI Quartel, Full Duplex, 4RJ45 Ports (EM400).....\$1,137
10/100 PCI (EM110TX)\$190
10/100 PCI (EM440).....\$1,170
10/100 ISA (EM110TX) Single/SPK\$195/924

SMC

10/100 EISA (SMC923DST)\$240
10/100 PCI (SMC933DST)\$194

ASANTE

10/100 PCI Adapter for PC and MAC\$187

100VG AnyLAN Adapter

KATRON

100VG ISA Adapter (DP-161)\$149
100 VG EISA Adapter (DP-32E)\$192

HEWLETT PACKARD

100VG 16-bit ISA 10/100 (J2573A HP)
Single/6PK.....\$170/985
100VG 32-bit EISA (J2577A HP)
Single/6PK\$227/1,319
100VG 32-bit PCI (J2585A HP)
Single/6PK.....\$166/890

100Mbps FX Adapter

COGENT

PCI-SC Connector (EM100)\$499
PCI-ST Connector (EM100FX)\$499
Eight-Port Fast FX Hub (S-800)\$3,285

FDDI Adapters

NETWORK PERIPHERAL

SAS PCI Singlemode (NP-PCI-S50)\$599
SAS PCI Multimode (NP-PCI-S10).....\$995
DAS PCI Multimode (NP-PCI-D10)\$1,360

100 Base-TX Fast Ethernet Hubs

INTEL

Express Stackable Hub, Twelve 100Base-TX Ports
Stackable up to Six Units (EC100TX)\$1,485



NBASE

100Base-TX Eight-Port Hub (NH108)\$1,425



NETWORTH

100Base-TX Eight-Port Hub (MICRO100).....\$1,350
Dual Speed Fast Ethernet Hub
Twenty Four-Port (MICRO10/100).....\$3,565

SMC

Tiger Hub 100 Sixteen-Port 100Base-TX Hub
(SMC5116TX).....\$2,398

D-LINK

100 Base-TX Twelve-Port Hub (DFE-812TX).....\$1,342

ASANTE

100 Base-TX Twelve-Port Stackable Hub\$1,545

BAY NETWORKS

Twelve-Port 100Mbps Hub (AT2202-001)\$1,740

3COM

100 Base-TX 12-Port Stackable Hub (3C250-TX/1)\$1,949

100Base-T4

Fast Ethernet with CAT 3 UTP Support

COGENT

10/100 PCI (EM110T4)\$190
12-Port Stackable T4 Hub (S-1200)\$1,590

100 VG AnyLAN Hubs

KATRON

100VG-AnyLAN Hub, 6-Port/12-Port
(DP1006/DP1012)\$840/1,330

HEWLETT PACKARD

Advanced Stack 100VG 15-Port Hub,
Stackable up to 16 Hubs (J2410A)\$1,835

100Mbps Macintosh

FARALLON

Fast Ether TX-10/100 NuBus (PN990)\$328
Fast Ether TX-10/100 PCI (PN994).....\$240

ASANTE

Fast 10/100 NuBus(99-00-364-00)\$299

ATM

Efficient Networks

155.52Mbps PCI ATM Adapter with 512K Memory
(ENI-155P-MF-C)\$1,200

NBASE

Multimode to Singlemode ATM Converter, 20KM Single
Link (Node Attach) (N420ATMI)\$3,995

Fibre Channel - The ATM Alternatives

ANCOR COMMUNICATIONS

Gigabit Fibre Channel,
1.0625 Gigabaud per Channel, Sixteen-Port
FCS1062 Fibre Switch\$46,797
FCS1062 PCI Adapter.....\$3,273

Ethernet, FDDI, Token Ring LAN Interface Modules Available

Internet & Remote LAN Access Products

ADTRAN

T1 DSU/CSU, V.35 Dte N1-24, T1 and Fractional,
B8ZS/AMI, SF/ESF Framing.....\$1,390
TSU-T1, 1200-060 L1 Data Channel DSU/CSU.....\$995

ASCEND

PipeLine 25 ISDN Bridge, IP/IPX Routing,
Compression, Built-in NT1 (P25-1URTRCOF)\$999
PipeLine 50 ISDN Bridge, IP/IPX Routing,
Compression, Built-in NT1\$1,020

PROTEON

RBX205 Router, One Ethernet, Two WAN, ISDN
with IP/IPX S/W\$2,605
Globetrotter 100 Remote Access Router,
Four-Port Ethernet LAN Repeater, Two WAN
Serial Ports with IP/IPX\$1,555

3COM

NetBuilder Remote Office 422, ISDN Access Super
Stack Router, IP and IPX (3C8422)\$2,699

ACC SYSTEMS

Nile Branch Office Bridge/Router with IP/IPX,
AppleTalk, One RJ45 LAN Port, One ISDN
BRI, One V.35 Port\$2,445

BAT

SU 56K DDS, Point to Point or Multipoint,
DSU/CSU, V.35 InterFace, Front Panel LEDs\$425

CISCO SYSTEMS

2501-IP Router, One Ether Port, Two Serial Ports,
Dial on Demand Call For Prices
2503-ISDN IP Router, One Ether Port, Two Serial
Ports, ISDN BRI Demand Call For Prices

Ethernet Network Adapters

WEST HILLS

ISA BNC (ENET16C)\$35
ISA RJ45 (ENET16T)\$35



ISA RJ45/BNC (ENET16CT)\$39
RJ45/BNC/AUI (HT2100PCI+PCI).....\$69
RJ45/BNC/AUI (HT2100VL VLB).....\$69
For SMC, 3Com, and Intel Ethernet Adapters -Please Call

Hubs

WEST HILLS

Eight-Port 10BT Hub, BNC & AUI Ports
(HT08TP)\$110
Sixteen-Port 10BT Hub, BNC & AUI Ports
(HT16TP)\$235



Sixteen-Port 10BT Smart Hub, AUI Ports
(UE2041)\$290

Transceivers

AUI to TP\$39
AUI to BNC\$39
AUI to 10Base-FL\$249
AUI to MultiMode Fiber (1300nm, 5Km)\$449
AUI to SingleMode Fiber (1300nm, 10Km).....\$549

Fast Ethernet Guide

Switched and Fast Ethernet, How It Works and How to
Use It, The Only Book Dedicated to The Latest in
Ethernet Networking Technology.....\$39

Receive Your Free Copy With The Purchase
Of Any Switch or 100Mbps Hub

Visa & MasterCard • Fast Delivery • Most Orders Ship The Same Day • Prices Subject To Change Without Notice

NBASE
North Hills • Gokom • NBase Switch

ASANTÉ

Bay Networks

**WEST HILLS
LAN SYSTEMS**
7949 Woodley Avenue, Van Nuys, CA 91406
1-800-FOR-LANS
1-800-367-5267
Technical Support: 818-773-8171 • Fax: 1-818-773-8932

3Com

intel

ciscoprio

Up to 4 Users Can Access Multiple PC, Macintosh, and Sun Computers from a Central Location!

Multipatform

Supports any combination of PC, Macintosh, and Sun computers. Use any platform's peripherals to access any type of computer in the system.

Multituser

Up to 4 users can access different computers simultaneously!

Multimedia

Every user has full multimedia capabilities; keyboard, mouse, video, microphone, speakers, and serial support available.



AUTOBOOT COMMANDER 4XP™

Cybox Computer Products Corporation
4912 Research Drive
Huntsville, AL 35805
1-800-932-9239 (205) 430-4030 fax
<http://www.cybox.com>



Cybox, Commander, AutoBoot and 4xP are trademarks of Cybox Computer Products Corporation. Sun is a trademark of Sun Microsystems. PC and Macintosh are registered trademarks of their respective holders. The Inc. 500 logo is a registered trademark of the Goldhirsch Group.

Dealer Program Available

Made in the USA

Reader Service No. 227

Provider to the Providers™



**Over 1,200
ISP Customers**

SAME DAY SHIPMENTS

**U.S. & CANADIAN
DISTRIBUTION CENTERS**

**VISA, MC, AMEX
ACCEPTED**

**800 #
TECHNICAL SUPPORT**

**ISPs • End Users • Remote Sites
• Telecommuters**

**Call today for
the best pricing on**

- **ROUTERS-** T1, ISDN, FRAME RELAY
- **TERMINAL SERVERS-** SLIP/PPP
- **V.34 MODEMS-** DESKTOP & RACKMOUNT
- **DSU/CSUs-** 56K, T1
- **FIREWALL ROUTERS**
- **ISDN PRODUCTS**

**Capella Worldwide stocks
Livingston, U.S. Robotics,
Telebit, Shiva, Ascend, Adtran,
Cisco, Microcom, Motorola,
TyLink & more.**

**Call Capella Worldwide -
the internetworking specialists.**

1-800-591-4264

**e-mail: info@capella.com
<http://www.capella.com>**

Reader Service No. 268

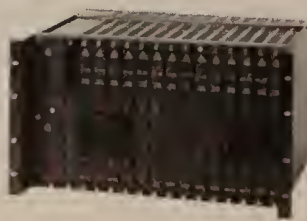
**Now you can
rearrange T1/E1
circuits
remotely...**



**With a switch that costs
less than \$110 per port!**

You no longer have to dispatch someone to move lines around or connect test equipment. With the TMX Matrix Switch, you simply point and click. The switch makes the changes, initiates the testing and documents what you did. And, our Windows™-based client/server management software gives you control from anywhere you can plug in a PC.

The TMX is inexpensive and it's small, too. A switch with 128 T1/E1 ports occupies only 10.5" of rack space. For more information on the TMX Matrix Switch, call 800-806-7680 or write Linear Switch Corporation, 225 Executive Drive, Moorestown, NJ, 08057.



Linear Switch Corporation

Reader Service No. 293

TeleSwitch II with AutoReboot function



To Telephone Line



Computer with Modem

Yes, there's a better way!
*You shouldn't have to be awakened
in the middle of the night because
your Server application for some
unknown reasons decides
to quit running*

**Proven Performance,
highly recommended by
industry specialists**

TeleSwitch II US\$169

Automatically reboots your computer system when it hangs or accepts commands by DTMF tones from remote telephone to turn on/off an electrical equipment for certain duration

Automatic Reboot function:

- monitors a character sent periodically from the Server/PC for continuity. When continuity is broken it will cause the Server/PC to do a cold boot
- simple to install and easy to use

Remote Switching function:

- Password Protected remote access
- DIP Switch selection for various modes of operation
- works with pulse dialling telephone as well as tone phones
- European versions available
- handles up to 3 Amp peak rating, 10 Amp resistive.

TeleSwitch US\$129

for switching on/off electrical equipment by tone commands from remote telephone

**VIVE®
Synergies Inc.**

Tel: (905) 882-6107 Ext. 16, 25, 26 or 20

For Product & Company Information:
1-800-567-4954

Fax-on-Demand: Tel. 905-882-6107 press 5
Internet: <http://www.vive.com/>

30 West Beaver Creek Rd., Unit 101, Richmond Hill, Ont. Canada L4B 3K1 FAX: (905) 882-6238

Reader Service No. 261



CYLINK

SUPER COP ON THE SUPER HIGHWAY

Introducing SecureLAN™ from Cylink.
The cost benefit of public switched networks combined with network security confidence.

Cylink, the industry leader for low cost network security over the internet, introduces SecureLAN, a family of products that keeps your network safe from intruders.

Certifiably secure.

SecureLAN uses hacker-proof digital certificate technology. In one system you get a complete set of security features including access control, authentication, integrity, and privacy. SecureLAN is based on industry standards which meet

or exceed next generation security standards: digital certificates, digital signatures, public-key cryptography, and Diffie-Hellman key management.

The SecureLAN family of products easily integrates into your existing network. SecureLAN provides security at the application level, between end nodes, domains,

and sub-networks, providing a comprehensive security solution for your entire enterprise network.

So, put the Cylink Super Cop on your Super Highway. Call 1.800.533.3958 (US) or 408.735.5800, (outside the US). We will send you the information you need to keep your network safe.



SecureLAN family of products provide network security over low cost public switched networks.



910 Hermosa Court, Sunnyvale, CA 94086, USA Tel: 408.735.5800 Fax: 408.720.8294 <http://www.cylink.com/>

© 1996 Cylink Corporation. SecureLAN is a trademark of Cylink Corporation.
Other trademarks or registered trademarks are the property of their owners. E-mail: info@cylink.com Fax on Demand: USA 800.735.6614 Int'l. 408.735.6614

For creating Java applications, WebGalaxy™
is like an espresso machine on steroids.



WebGalaxy™ generates complex Internet/Intranet Web Server business applications automatically from a graphical development environment. That's right, Java™ applications instantly! All you have to do is add knowledge...and serve.

For more information on WebGalaxy™, visit the real thing:
<http://www.webgalaxy.net/nw>, or call 1.800.475.7171

<http://www.webgalaxy.net/nw>



The application of knowledge™

Java is a registered trademark of Sun Microsystems, Inc. WebGalaxy™ is a trademark of Allen Systems Group, Inc. © Copyright 1996, Allen Systems Group, Inc. All rights reserved.

Reader Service No. 229

INTERNET

SERVICE PROVIDERS AND CORPORATE USERS

*Is Bandwidth Availability Affecting Your Business?
Are Your Capital Expenditures too High?*

Paragon Networks' **INTERNETworking Access Manager** provides:

- Lowest cost solution for high speed Internet access
- Integration of multiple network services at a single access point
- Multiple functionality - eliminating the need for added capital expense
- World's smallest solution for domestic and international markets

The INTERNETworking Access Manager is PNI's newest addition to its Series 8500 family of integrated access products. It enables provisioning, access to, and support of multiple internetworking services which use today's existing facilities, eliminating the need for added capital expenditures.

For more information about the INTERNETworking Access Manager or any of PNI's products, contact Peter Meroni, Product Marketing Manager, at **1-800-8500-PNI** or Marketing@paragon-networks.com.



Paragon Networks International Inc.
800 Main Street South, Suite 210
Southbury, CT 06488

Reader Service No. 304

Total Networking SOLUTIONS

- Plug & Play CD-ROM Networking
- Compatible with ALL Major Operating Systems
- Choose 4X, 6X, or NEW 8X CD-ROM Drives
- From 4 to 256 Drive Arrays
- Remote Dial-In Access CD-ROM Servers
- Intranet Servers
- CD-Recordables and Duplicators
- Partners with Other Major Manufacturers
- Available on GSA Contract
- Toll-Free Technical Support



TODD ENTERPRISES INC

(800) 445-TODD

(516) 487-3976 • FAX (516) 466-6774

www.toddent.com



NEW OPTI-NET Direct

A hardware-based solution providing shared CD-ROM access over your Ethernet network. Plug & Play and Web Server features. No TSRs and no NLMs!

Reader Service No. 266

**FREE
Product Info**

**Remember to fill out your
Reader Service Card
in this issue!**

**With RADCOM's ATM
Analyzer you'll be fluent in
200 protocols in no time.**



**DataComm
MAGAZINE
HOT
PRODUCTS
JANUARY 1996**

January 1996



November 1995

Signalling Simulation

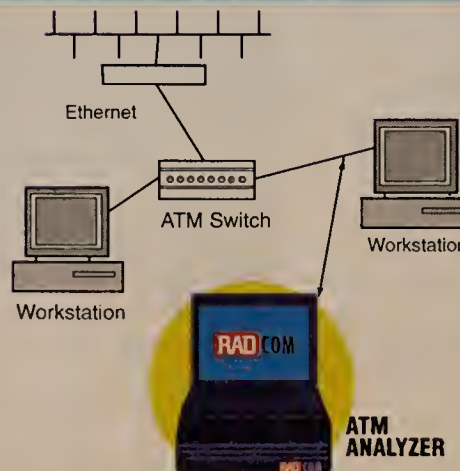
- Simulate an entire virtual ATM network - all protocol layers
- Easily configure and re-configure the network
- Easily stress test ATM products
- Inject over 800 conditional errors
- Expert System for Signalling

Real-Time Decode

- Decode over 200 Protocols: LAN Emulation, RFC's 1483 & 1577, SSCOP, ILMI, UNI 3.0 & 3.1, TCP/IP, IPX, SPANS™
- The only analyzer that can monitor LAN Emulation in real time

Supports all ATM Interfaces

- Each Interface card supports full duplex monitoring & simulation
- Each card is less than \$5,000



Phone: 1-800-RADCOM-4 201-529-2020 Fax: 201-529-0808
E-Mail: 74777.3702@compuserve.com Web Site: <http://www.radcom.co.il>

RADCOM

Reader Service No. 300

DLT HEAVEN

Looking at DLT technology to upgrade your data storage? ADIC manufactures the industry's most complete line of DLT products. It includes stand-alone drive systems, the new VLS DLT desktop library, and the new Scalar libraries for both network systems and UNIX data centers.

Compatible with all leading applications software, more than 12,000 ADIC tape libraries are in the field, performing backups, providing HSM support, and generally taking the hassle out of tape management.

Call today for more information about ADIC's DLT solutions—and about our complete line of 4mm and 8mm products.



VLS DLT Series Libraries

One-drive library with 7-tape magazine
Desk top or rack mount

VLS DLT300

Capacity: 105GB; 210GB*
Transfer rate: 75MB/min; 150MB/min*

VLS DLT400

Capacity: 140GB; 280GB*
Transfer rate: 90MB/min; 180MB/min*



VLS Series
Product of the Year
1994

1-800-336-1233



email: info@adic.com

Web site: <http://www.adic.com>

* Note: All capacities and transfer rates are listed at native and with 2:1 compression. DLT is a trademark of Quantum Corporation

Reader Service No. 246

**A remote access router,
FRAD, data compressor and
a DDS CSU/DSU you can
upgrade to T-1...**

**All in one box. You won't find
a package that's easier to install !**

None of the hassles of connecting and maintaining all those separate devices. And, with the powerful Eastern Research SpanNet router, it's an easy upgrade when you're ready to go from DDS to T-1 and/or add a second WAN port.

The SNMP-managed SpanNet router supports IP/IPX routing and concurrent spanning tree bridging. It uses the industry-standard Stac algorithm for data compression and includes frame relay support, a dial back-up port, V.54 diagnostics, a built-

in BERT and flash memory. All for only \$1495 with a V.35 interface, \$1795 with a DDS CSU/DSU or \$1995 with a T-1 CSU.

For more information on SpanNet Routers and other unique Eastern Research products, call 800-337-4374 or write Eastern Research, 225 Executive Drive, Moorestown, NJ, 08057.



Reader Service No. 225

Try CheckPoint FireWall-1™ for 30 days.

Call 1-800-325-9870, ext. 270

CheckPoint's FireWall-1™ is the #1 selling access control software for Internet security — **in use by more than 10,000 companies**. It's available for UNIX, Solaris, HP UX, and now Windows NT. Find out why FireWall-1 is your best security solution, and why it's more effective than any proxy-based or conventional packet filter system. Call Internet Security Corporation today at 1-800-325-9870, ext. 270. And arrange for your full-function, evaluation copy of FireWall-1, yours to use for 30 days. **Don't wait** for an Internet security breach. Call now!

Internet Security Corporation
245 Winter Street
Waltham, MA 02154

800-325-9870
Fax: 617-487-7791
Email: info@security.com
<http://www.security.com>



©1996 Internet Security Corporation. Firewall-1 is a trademark and CheckPoint is a registered trademark of CheckPoint Software Technologies Ltd. All other products or services mentioned herein are trademarks or registered trademarks of their respective owners.

Reader Service No. 303

Don't wait for an Internet security breach.

NEW EQUIPMENT ONLY. NEW EQUIPMENT ONLY

Attention IS and Procurement Managers!

Stretch your budget by an additional 15 to 30% and more! We emphasize only U.S. and Industry Leaders while providing their products at exceptionally competitive prices. Call for an immediate price Quote and we'll fax or mail you a 2-page Brochure with over 500 of the Networking and Data Comm Industry's Hottest Products! Categories include:

100MBPS SYSTEMS, SWITCHING HUBS, BRIDGES, ROUTERS, REMOTE ACCESS, ISDN CONNECTIVITY, ATM, CSU/DSU, NOS, E-MAIL, UNIX, NIC'S, CONVERTERS, REPEATERS, HUBS, MAINFRAME CONNECTIVITY, NETWORK UTILITIES, PRINT SERVERS, TAPE BACK-UP, CD ROM, UPS, SECURITY, NETWORK UTILITIES AND MORE!

AUDAX COMMUNICATIONS, INC.

Call Toll-Free
1 (800) 589-8709
or fax 1 (415) 589-9100

Sign on to our Web Site! <http://www.audaxcom.com>

Circle Reader Service No. 290

NETWARE COMPETITIVE PRICES*

NOVELL # USER	Netware ver. 3.12	Netware ver. 4.1
5	495.	495.
10	995.	995.
25	1,495.	1,495.
50	1,995.	1,995.
100	2,795.	2,795.
250	Call	Call

NOVELL UPGRADE 60% OFF LIST

WE CARRY A FULL LINE OF NETWORKING PRODUCTS FROM ALL MANUFACTURERS.

KEYNET CORPORATION

CALL US FOR ALL YOUR NETWORKING NEEDS!!!
(800) 307-5242
or Fax (714) 378-4757
<http://www.keynet.com>

WE ACCEPT
VISA + MASTERCARD
A.E. + P.O. + COD

* Prices are subject to change without prior notice.
* Novell & Netware are registered trademarks of Novell, Inc.

Circle Reader Service No. 263

ROUTERS BUY / SELL / REPAIR

CISCO WELLFLEET
IBM 3COM CABLETRON
SYNOPTICS PROTEON

COMSTAR Buys, Sells and Repairs NETWORK Equipment.
Bridges • Routers • Hubs
NIC's • 5250/3270 • Emulation • MAU's/CAU's/LAM's

COMSTAR, INC.
The #1 NETWORK Remarketer
612-835-5502

FAX: 612-835-1927
5250 W. 74th St., Minneapolis, MN 55439

Circle Reader Service No. 234

NEW REFURBISHED BUY SELL NEW REFURBISHED BUY SELL

MSI Communications

Nationwide Services • 24-Hour Technical Support
CNE Services • Trade-In Credit

WAN Products	Distribution Products	LAN Products
Adtran	Codex	Bay Networks
AT&T Paradyne	GDC	Cisco
BAT	IBM	Compression Labs
Digital Link	Micom	Cubix
INC	Motorola	Develcon
Micom	Racal Milgo	Livingston
NET		Madge
Newbridge		Novell
Verilink		Xyplex

Specialized Products
Refurbished
CISCO SYSTEMS
AGS+, 2500's, 4000's, 7000's

Data, Voice & Video Networking
7 Waterloo Road, Stanhope, NJ 07874
TEL 201-347-3349 • FAX 201-347-7176
<http://www.msic.com>

An ESOP Company....Where the Employees are Owners

Circle Reader Service No. 232

Protocol Reference Guides

Only \$5.95 each

Save valuable time troubleshooting your internetwork with these Reference Guides. Each laminated guide is 8 1/2" x 11", double-sided, and available for only \$5.95 each, plus shipping. Titles include:

LANs	Architectures	WANs	Net Mgt	Internets
• Ethernet/IEEE 802.3	• AppleTalk	• ATM	• SNMPv1	• TCP/IP
• FDDI	• Banyan VINES	• Frame Relay	• SNMPv2	• IPv6 (IPng)
• Token Ring/IEEE 802.5	• DECnet Phase IV	• ISDN	• RMON	• OSPF
• LAN Cabling	• GOSIP version 2	• SMDS	• RMON2	• ISO IS-IS
• Physical Layer	• Novell Network	• SONET	• WAN MIBs	• ISO ES-IS
• Data Communication	• The Internet	• X.25	• UNIX	• ISO TP/CLNP

Call Us for More Information and a Free Catalog
Hollister Associates • P.O. Box 575 • Lyons, CO 80540 • (303) 682-2634
Internet: hollister@csn.net

Circle Reader Service No. 270

FOR MORE INFORMATION ABOUT MARKETPLACE
1-800-622-1108

USED CISCO DIRECT

➤ Routers ➤ Switches
➤ Hubs ➤ Modems
➤ ISDN/ATM ➤ NICS
➤ T1 CSU/DSUs
➤ Synoptics ➤ 3COM ➤ IBM ➤ Modge
➤ Ascend ➤ Cabletron ➤ USRobotics ➤ Shivo
➤ Motorola ➤ Bay Networks ➤ Livingston
➤ ADC Kentrox ➤ Sun ➤ Intel

m/Net
m/Net Communications Inc. 43-26 52nd Street Woodside NY 11377
Voice 718-565-3033, Fax 718-899-1019, Web www.mnet.com

DIGITAL WAREHOUSE
Your Information Superhighway Discount Source
VISA **1-800-553-4383** M/C
Circle Reader Service No. 259

You know your product has the potential to be a success. So, spread the word!

Let more than 150,000 qualified Network IS Professionals know what you have to offer.

Don't Gamble with Your Sales!

Call Carla Cappucci at
1-800-622-1108 ext. 465

HUGE 3Com INVENTORY
NETBUILDER I-II, IB, CS, FMS I-II, ECS, MSH, 3GH, LANPLEX, MULTICONNECT, BICC

LAN/WAN NEW/USED

3Com...CABLETRON...SYNOPTICS...SMC...CISCO...NOVELL...NETWORTH...BICC...Proteon +

SUPER HUB DEALS!	SWITCHES	HUBS	CABLETRON (U)
24 PORT 10BT\$700	3Com 24 PORT...\$3200	EAGLE 8 PORT\$100	TPMIM-24\$995
12 PORT\$400/\$250	3Com 6 PT/FDI...\$4200	BAY 12 PORT\$625	THINMIM\$500
FMS2 24 PORT...\$850	ACTN 8 PORT...\$1950	BAY 24 PORT\$995	MT800\$125
FMS2 12 PORT...\$475	BAY 6 PORT\$2100	SMC 12 PORT\$400	IRBM\$700
6 PORT FIBER...\$1350	CISCO 16 PORT \$4700	BOCA 16 PORT\$295	IRM2\$750
10 PORT COAX...\$1275	LOTS MORE - CALL!	PLENTY MORE!	MR9000C\$495
*MINIMUM QTY 3			FR3000\$700
			MR2000C\$325
			MMACB-FNB\$550
			MMACB8-FNB\$675
			TPMIM\$350
			TPMIM-34\$1200
			TPMIM-T3\$350
			TPMIM-44A\$1800
			TRMIM-12\$600
			PSM-R\$325
			MUCH MORE - CALL

SUPER NIC PRICES!!	FAST ENET	SUPER NIC DEALS!!	PROTEON (U)
509B-TPO\$75*	3Com 12 PORT...\$1925	SMC 8416T\$70*	CNX/DNX CALL
509B-COMBO\$95*	SMC 8 PORT\$1150	SMC 8 PORT\$125*	P7XXX CALL
509B-COAX\$90	SMC 16 PORT\$2200	PCL8225\$75*	P9XXX CALL
509TP-PCI\$105*	NTWRTH 8 PT\$1350	PCL8100\$65*	P2XXX CALL
509-COMBO\$130*	HP 15 PORT\$2025	MANY MORE-CALL	PLENTY OF STOCK!
595TX 10/100\$150*	MORE BRANDS - CALL		
589B-TP PCMC\$125			
3Com 8 BIT TP\$30*			
619 16/4 TR\$150			

ROUTER VALUES!!	CISCO (U)	TOKEN RING (U)	NETWORTH (U)
5303 LOCAL\$950	IGS/R\$700	IBM 8228\$95	UTPM SMART\$495
58XX 2X2 T1\$1250	AGS+ CALL	STARTERK CALL	4000/6 CHASSIS\$600
8221 1X1 T1\$1595	25XX CALL	IBM 16/4 TR\$150	MORE AVAILABLE!
8227 1X3 T1\$2900	CSCME6\$2200	INTEL 16/4\$130	
8421 2X4 ISDN\$1995	MORE AVAILABLE!	PROTEON 16/4\$100	
MUCH MORE - CALL!!!		3COM 16/4\$130	
		LOTS MORE - CALL!	

ERGONOMIC INC. 47 Weisman Court • Plainview, NY 11803 • Purch: 516-293-5200 • FAX: 516-293-5325

WE WARRANTY! WE BUY YOUR USED LANS/WANS QTY DISCOUNTS!

VISA/MC/AMEX FOR SALES ONLY CALL TOLL FREE OUR 14TH YEAR!
800-AKA-3Com (800-252-3266) U=Used
Circle Reader Service No. 271

©1996 HERGO. Ergonomic Support Systems, Inc.

COMPUTER RACKS

■ Custom-tailored ■ Modular ■ Easy set up
■ Space Saving ■ Expandable

HERGO
321 5th Ave., New York, NY 10016
TEL: (212) 684-4666 FAX: (212) 684-6853

Call 1-800-434-3746

To become a Hergo Authorized Reseller, ask for ext. 40

Circle Reader Service No. 280

NETWORK HARDWARE
ROUTERS • HUBS • BRIDGES • MODEMS • MUXES
DSU/CSU • FRAME RELAY • T1 • ISDN

BUY/SELL/LEASE

CISCO

MOTOROLA • ASCEND • LIVINGSTON • 3COM
BAY NETWORKS • CISCO • ADTRAN • US ROB

800-230-6638
Fax: 805-964-5649 email: usedcisco@aol.com

Network Hardware Resale, Inc.
1800 THE STRAND • HERMOSA BEACH, CA 90254

Circle Reader Service No. 244

VANDY FOR ALL YOUR NETWORK NEEDS!

Network S/W	Internet & Remote LAN Access	100baseT Fast ENET Hubs
All Novell (Best Prices) \$ CALL	3COM	3COM
Microsoft \$ CALL	Netbuilder remote 422/ISDN \$950	100BTX 12 port stack \$1,895
10/100 ENET Switch		Networth
Bay Network	Cisco	100BTX 8 port hub \$995
10/100 Mbps UTP Sw \$12,295	2501 IP-Router \$1,860	Dual speed ENET 24 port \$3,490
100 Mbps Fiber Sw Hub \$13,950	2503 ISDN BRI Router \$2,250	
Networth	Small Office/Home Office Access- Connect your phone, Modem, and PC via ethernet to a single ISDN line for Internet connection or to connect with your corporate office network. \$995 Complete!	Bay Network
Fast Pipes 6 port hub \$3,495		100BTX 12 port hub \$1,655
Fast Pipes 12 port hub \$3,990		SMC
		Tiger hub 100 16 RJ45 \$2,560
		Tiger hub 100 8 RJ45 \$1,275

100 Mbps ENET Adapters	Remote LAN Access-	Video Conferencing
3COM	Connect a remote workgroup to the corporate network via ISDN, or SW56.	C-Phone- Network based Video Conferencing system, Incl: Camera/Speaker/MIC, Full Screen Video, No N/W Bandwidth degradation, Up to 64 Simultaneous calls, H.320, ISDN up to 384K, T1, SW56, WAN Network or Standalone available.
10/100 PCI 1/5pk/20pk \$148/670/2595	\$1,195 Complete! *ISDN Connection	Starting At \$1895 Per Seat - Call for Details!
Cogent	Corporate LAN Access- Connect your corporate enterprise network out to smaller remote locations. This remote access server supports up to 30 concurrent analog or digital dial-in users. Supports T1, BRI/PRI, or Frame Relay connections. \$5,910 Complete! *48K ISDN Connections	VISA/MC/AMEX
10/100 PCI 1/5pk/20pk \$195/755/2685		CORPORATE OF SCHOOL/PC's Welcome
10/100 PCI (EM440) \$1120		Prices and Specifications Subject to Change
10/100 ISA 1/5pk/20pk \$190/895/3555		All Trademarks and Trade Names are the Property of their Respective Holders

Vandy Micro Corporation
27001 La Paz Rd Ste 284
Mission Viejo, CA 92691
(800)373-2485
Tel: (714)768-1595, Fax: (714) 768-1063
EMAIL: vandy5@ix.netcom.com

Circle Reader Service No. 221

If you sell LAN Equipment or Services, Network World has 145,709* subscribers that you need to reach!

Number of subscribers who are involved in the purchase of the following LAN products:

Network Test Equipment	87,431
LAN Storage/Backup	104,867
SNMP Network Management.....	64,222
Cables, Connectors, Baluns	97,182
Routers	97,373
Hubs/Intelligent Hubs	89,018
UPS	94,868
ATM Switches.....	49,921

All information extracted from December 1995 BPA

Would you like these numbers broken down by site purchasing influence? Call us, we will be happy to send you our December 1995 BPA.

Advertise in the Marketplace and make an impact on your sales! For more information call Carla Cappucci at (800)622-1108 ext. 465.

* Denotes number of non-duplicated responses to this category, recipients may have checked more than one sub-category.

Do Not Lose Your CNE CERTIFICATION

Novell requires all CNEs to pass either NetWare 3.1x to 4.1 Update or Administration 4.1 test by 08-31-96 to keep the certificate valid.

System Administration 4.1\$95
NetWare 3.1x to 4.1 Update\$95
All 7 Manuals for 3.1x Track ...\$450
All 7 Manuals for 4.1 Track\$495

Concise to-the-point specifically written for professionals

CNE Test Master for Windows \$149

Software that has more than 2600 multiple choice practice questions for 11 Novell CNE tests covering both 3.1x & 4.1 tracks

- Novell CNE Study Guide • MTL (Demo)
- NSE Pro (CD-ROM)

When you order all 7 manuals and CNE Test Master

PC Age, Inc.

1-800-PCAGE-60 (800-722-4360)
20 Audrey Place; Fairfield, NJ 07004
Tel: 201-882-5370 • Fax: 201-882-4955
visit us on the WEB at:
<http://www2.cybernex.net/~pcage>
or e-mail: pcage@bc.cybernex.net

Circle Reader Service No. 248

**FREE
FREE
FREE**

Call for FREE information on how to make your advertising program work in the Marketplace!

**Carla Cappucci
1-800-622-1108**

INTERNET SERVICE PROVIDERS & WEB HOSTS

HoloNet Web Hosting

(510) 704-0160 National
<http://www.holonet.net>
ONE FREE month 56kbps Web Hosting

New York Net

(718) 776-6811 NY/NJ/CT/PA/MA
sales@new-york.net
SLIP, PPP, Leased Lines, T1s, Frame Relay, 10Mbps

IBM Internet Connection

(800) 455-5056 National
globalnetwork@info.ibm.com
SLIP, Leased Lines

UUNET Tech. (AlterNet)

(800) 258-9690 National
info@uu.net
Web Svrs, Frame Relay, ISDN, PPP, Leased Lines, Security, SLIP, UUCP

InterNex Information Svcs.

(408) 327-2388 California
info@internex.net
Leased Lines, ISDN, SMDS, Frame Relay, Web Hosting, T1, T3, Intranet

For information on listing your service here, contact Carla Cappucci at 800-622-1108 x465, ccapp@nww.com

NOVELL NETWARE V4.1

*5 USER	\$ 499
*10 USER	\$ 999
*25 USER	\$1299
*50 USER	\$1499
*100 USER	\$1899
250, 500, 1000 User and V3.12 call for price.	

WE WILL BEAT OR MATCH ANY ADVERTISED PRICE

For more products visit us on-line
<http://www.fcsnet.com>
Prices are subject to change.

**FIRST COMPUTER
1-800-325-1911**

Circle Reader Service No. 277

INFORMATION DATA PRODUCTS CORP.

Modems
Multiplexers
DSU/CSU's
T-1/FT-1
Voice/Data
Bridges/Routers

New - Refurbished
"Data Communications Specialists"

1-800-362-3770

wan-info@planet.net
<http://www.planet.net/idpc>

Circle Reader Service No. 217

SAVE 50% & MORE ON MOST PRODUCTS BUY/SELL/NEW/USED

VISA RENT MC
Reconditioned With Warranty
Modems • Multiplexers • T-1 CSU/DSU's • Channel Banks

CSU/DSU, ALL RATE, V.35/RS232	\$99
Newbridge Channel Banks	\$2995
Micom Marathon 1K, 5K, 10K 50% off	
AT&T CSU/DSU NEW!	\$275
T-1 CSU's	\$359
CSU/DSU 56KBPS, V.35	\$195
Telco Systems Channel Banks	\$2995
Newbridge 3600 Modules CALL	
Datatel DSU/CSU 56KBPS	\$375
AT&T Channel Banks	\$2995
Stat Muxes 4, 8, 16, 32, port.....LOW	
T-1 CSU/DSU V.35	\$895
Channel Bank Rentals.....	\$299/month

METROCOM
(800) 364-8838 or (713) 496-8500
FAX (713) 496-8449 24 HRS
[HTTP://www.Metrocominc.com](http://www.Metrocominc.com)

Circle Reader Service No. 220

LAN/WAN • BUY/SELL FULLY WARRANTED NEW/REFURBISHED RENTAL LEASE
MODEMS
DSU/CSU's
MULTIPLEXERS
T-1 EQUIPMENT
HUB, BRIDGES, ROUTERS, ETC.

Fibermux Cabletron Synoptics
CISCO SPECIALISTS
AT&T Bay Networks
We carry all manufacturers, call John, ext. 101.

PHONE 800-783-8979
FAX (916) 781-6962
ADC S INC.
VISA MC

Circle Reader Service No. 240

REFURBISHED

SynOptics



Bay Networks

Largest Inventory of Refurbished SynOptics in America!

- SynOptics Trained
- Proven Track Record
- SynOptics Authorized
- We Stock What We Sell!
- One Year Warranties
- We Buy Used Equipment

CABLETRON systems
The Complete Networking Solution™

NOVELL

3Com

IBM

Wellfleet

protron

WE REPAIR ALL SYNOPTICS

**National LAN Exchange
800-243-LANS**

VISA MC

1403 W. 820 N. Provo, UT 84601 Voice 801-377-0074 FAX 801-377-0078

Circle Reader Service No. 231

NETWORK WORLD, INC.

THE MEADOWS
161 WORCESTER ROAD, FRAMINGHAM, MA 01701-9172
(508) 875-6400/FAX: (508) 879-3167

Colin Ungaro, President/CEO
Evelyn Thibault, Senior Vice President/Publisher
Mary Kaye Newton, Assistant to the President
Eleni Brsbois, Sales Associate

ADMINISTRATION

Mary Fanning, Vice President Finance and Operations
Frank Coelho, Office Services Manager
Paul Mercer, Billing Manager
Mary Rinaldo, Telecommunications Administrator
Tom Garvey, Mailroom Supervisor
Tim DeMeo, Mailroom Assistant

HUMAN RESOURCES

Mary Cometta Brown, Human Resources Director
Danielle Volpe, Human Resources Assistant

MARKETING

Virginia Lehr, Director of Marketing
Joanne Wittren, Senior Marketing Services Manager
Kirstin Wattu, Marketing/Promotions Manager
Barbara Sullivan, Market Research Analyst
Heidi Creighton, Public Relations Manager
Donna Kirkey, Reprint Manager/Sr. Graphic Designer
Nancy Vickers, Graphic Designer

ADVERTISING OPERATIONS

Karen Wallace, Manager of Advertising Operations
Cathy Sampson, Sr. Advertising Account Coordinator
Ann Jordan, Advertising Account Coordinator
Mario Matoska, Direct Response Ad Coordinator

PRODUCTION

Ann Finn, Production Director
Greg Morgan, Production Supervisor

RESEARCH

Ann MacKay, Research Director

CIRCULATION

Deborah Winders, Vice President Circulation
Richard Priante, Director of Circulation
Bobbie Cruse, Assistant Circulation Director
Mary McIntire, Circulation Assistant

IDG LIST RENTAL SERVICES

Christine Cahill, Sales Representative
P.O. Box 9151, Framingham, MA 01701-9151
(800) 343-6474/(508) 370-0B25, FAX: (508) 370-0020

PROFESSIONAL DEVELOPMENT GROUP

William Reinstein, Senior Vice President/Business Development
Debra Becker, Marketing Manager
Ann Roskey, Product Manager/Online Services
Ed Garabedian, Systems Specialist/Online Services
Christie Sears, Finance/Operations Manager
William Bernardi, Senior Product Specialist
Peter Halliday, Product Manager/NetDraw
Tina Pescaro, Operations Assistant
FAX: (508) 820-1283

NETWORK INFORMATION/ DIGITAL IMAGING SERVICES

Jack McDonough, Network Director
Enc Powers, Network/IS Support Specialist
Rebecca Simson, IS/Online Assistant
Anne Nickinello, Digital Imaging Manager
Deborah McKenna, Imaging Specialist
FAX: (508) 875-3090

DISTRIBUTION

Bob Wescott, Distribution Manager
(508) 879-0700

IDG

Patrick J. McGovern, Chairman of the Board Kelly Conlin, President Jim Casella, Chief Operating Officer William P. Murphy, Vice President Finance
Network World is a publication of IDG, the world's largest publisher of computer-related information and the leading global provider of information services on information technology. IDG publishes over 200 computer publications in 63 countries. Forty million people read one or more IDG publications each month. Network World contributes to the IDG News Service, offering the latest on domestic and international computer news.

SALES OFFICES

Carol Lasker, Advertising Director

Debbie Lovell, Sales Associate
161 Worcester Road, Framingham, MA 01701
(508) 875-6400/FAX: (508) 628-3976

NORTHEAST

Tom Davis, Eastern Regional Manager
Thomas J. Soevyn, Manager Strategic Projects
Debbie Lovell, Sales Associate
Donna Pomponi, Senior District Manager
Nancy Robinson, District Manager
Jolene Springfield, Sales Assistant
161 Worcester Road, Framingham, MA 01701
(508) 875-6400/FAX: (508) 628-3976

MID-ATLANTIC

Jacqui DiBianca, Senior District Manager
Rick Groves, District Manager, Sales Manager IntraNet Magazine
Barbara Stewart, Sales Assistant
351 E. Conestoga Road, Wayne, PA 19087
(610) 971-1530/FAX: (610) 975-0837

MIDWEST

Bob Mitchell, District Manager
Anna Caran, Sales Assistant
1011 E. Touhy Avenue, Suite 550, Des Plaines, IL 60018
(708) 297-8855/FAX: (708) 827-9159

CENTRAL

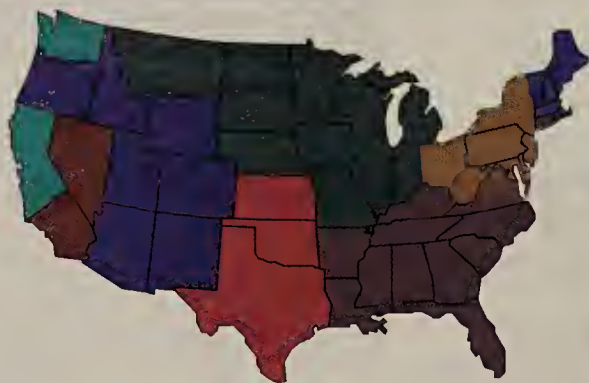
Dan Gentile, Midwest Regional Manager
Anna Caran, Sales Assistant
14205 Sumet Road, Suite 534, Austin, TX 78728
(512) 246-7044/FAX: (512) 246-7703

NORTHWEST

Sandra Kupiec, Western Regional Manager
Vivian Ritondale, Senior District Manager
Paula Connor, District Manager
Cynthia Schaeffer, District Manager
Carol Stiglic, Inside Sales Representative
Beverly Davis, Sales Assistant
Tracie Brown, Sales Assistant
5201 Great America Parkway, Suite 440, Santa Clara, CA 95054
(408) 567-4150/FAX: (408) 567-4166

MOUNTAIN REGION

Mike Hiatt, District Manager
Brooke Daniels, Sales Assistant
One East Center Street, Suite 300, Provo, UT 84601
(801) 371-0625/FAX: (801) 371-0669



SOUTHWEST

Amy C. Bartulis, District Manager
Tracy Pennell, Sales Assistant
2171 Campus Drive, Suite 100, Irvine, CA 92715
(714) 250-3006/FAX: (714) 833-2857

SOUTHEAST

Don Seay, District Manager
Terry Sanders-Prentice, Sales Assistant
Lakeside Commons, 990 Hammond Drive,
Suite 600, Atlanta, GA 30328
(770) 394-0758/FAX: (770) 394-6354

DIRECT RESPONSE ADVERTISING Response Card Decks/Marketplace

Joan Bayon Pinsky, Director Direct Response Advertising
Clare O'Brien, Sales Manager
Richard Black, Account Executive
Carla Cappucci, Account Executive
Heather Fairbanks, Account Executive
Sharon Chin, Sales/Marketing Operations Coordinator
Chris Gibney, Sales Assistant
(508) 875-6400/FAX: (508) 628-3976

RECRUITMENT ADVERTISING

Pam Valentinas, Director of Recruitment Advertising
Tarji Murray, Sales Associate
(508) 875-6400/FAX: (508) 820-0607

EDITORIAL INDEX

3Com.....	16,29	L	LDDS WorldCom.....	14
A		Lotus.....	6,10,42	
Acer.....	63	Lucent.....	6	
Action.....	41	M		
Adams & Reynolds.....	20	Maximum Information.....	6	
AirSoft.....	14	McAfee.....	29	
Allen Systems.....	39	MCI.....	1,25	
Ameritech Cellular.....	25	Microsoft.....	1,6,10,32,34,42,66,84	
Andrew.....	1	Motorola.....	19	
Ascend.....	10	N		
Ascom Timeplex.....	55,56	NET.....	55	
AT&T.....	6,25,48	NetManage.....	6,41,43	
AT&T Paradyne.....	20	Netscape.....	43	
AT&T Wireless.....	25	NetTech.....	1	
B		Network Computing Devices.....	41	
Bay.....	6,14,19,29,30	Newbridge.....	55	
Bell Atlantic.....	25	Nortel.....	10,56	
Bell Atlantic NYNEX Mobile.....	25	Novell.....	10,29,34,66	
C		NYNEX.....	25	
CA.....	1,6	O		
Callware.....	66	Open Environment.....	39	
Cambio.....	20	Oracle.....	43	
Centillion.....	6	P		
Cheyenne.....	6	PacBell.....	20,25	
Cisco.....	10,14,20	Penril.....	14	
Compaq.....	63	Platinum.....	1,39	
Compuware.....	19,20	Proteon.....	19	
CrossComm.....	8	R		
Crystal Services.....	41	RTL.....	29	
D		S		
Digital.....	8	SAP.....	1,16	
Dow Jones.....	43	Seagate.....	41	
DSC.....	25	Server Technology.....	29	
E		Shiva.....	14	
Ericsson.....	20	Sprint.....	25	
F		Stac.....	43	
FileNet.....	39	Sterling.....	19	
G		StrataCom.....	56	
General Magic.....	19	T		
GTE Mobilnet.....	25	Tivoli.....	10	
H		Traveling Software.....	43	
HAHT.....	39	V		
HP.....	1,10,66	Vantive.....	19	
I		VeriFone.....	6	
IBM.....	1,6,10,14,20,34,39	W		
Intel.....	29	Worldtalk.....	39	
IPC.....	63			

ADVERTISER INDEX

Advertiser.....	Reader Service#.....	Page#.....	Advertiser.....	Reader Service#.....	Page#.....
3COM Corp.....	26.....	54	Carrier Access Corp.....	251.....	74
Alcatel Network Systems.....	31.....	24	Castle Rock Computing.....	252.....	71
Apple Computer Inc.....	32.....	38	Cybox Computer Products Corp.....	227.....	76
Bay Networks.....	32.....	88	Cylink Inc.....	250.....	77
Border Networks Technology.....	33.....	30	Dataprobe.....	285.....	72
Canon USA Inc.....	27.....	28	Eastern Research.....	225.....	79
Checkpoint Software.....	28.....	60-61	Frontier Technologies.....	274.....	73
Compaq Computer Corp.....	22,86-87		Internet Security.....	303.....	79
DCI/MEN.....	58		Isolation Systems.....	262.....	72
DCI/NWW Unplugged.....	33		Linear Switch Corp.....	293.....	76
Dell Computer Corp.....	12-13		MaxNET.....	267.....	74
Digital Equipment Corp.....	2-3		NetSuite.....	71	
Dynatech.....	34.....	42	Paragon Networks Int'l Inc.....	304.....	78
General Datacomm.....	36.....	17	RADCOM.....	300.....	78
Gensym Corp.....	35.....	20	Rave Computer Associates.....	302.....	74
Hewlett-Packard.....	7		SilCom.....	269.....	74
Hughes Networks.....	37.....	50-51	Technically Elite.....	247.....	72
IBM.....	11,35,36-37,44-45		TODD Enterprises Inc.....	266.....	78
IPV6.....	41		Vive Synergies.....	261.....	76
Lucent Technologies.....	4		West Hills LAN Systems.....	297.....	75
Microsoft Corp.....	1B,26-27				
Network 1.....	44.....	15			
Newbridge Networks Inc.....	38.....	46			
NORTEL.....	39,40.....	21,31			
RAD Data Communications.....	29.....	32			
Sequel Technology.....	42.....	9			
SNET.....	41.....	40			
Softbank Corp.....	65				
Sprint.....	52				
Unisys Corp.....	57				
Verilink Corp.....	30.....	23			
Visual Networks Inc.....	43.....	59			

Advertiser.....	Reader Service#.....	Page#.....	Marketplace Advertiser.....
Bay Networks			Astrocom
Digital Equipment Corporation			Avalan Technology
In Focus			Capella Worldwide
Microsoft			Cylink
Nortel			Excel Computer
Novell			Distinct Corporation
Sprint			Frontier Technologies
Stratacom			Internet Security Corporation
			MaxNet
			Silcom
			TAC Systems Inc.
			TGV

These indexes are provided as a reader service. Although every effort has been made to make them as complete as possible, the publication does not assume liability for errors or omissions.

DIRECTORY OF SERVICES

NetworkWorld TECHNICAL SEMINARS

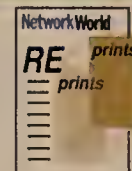
Network World Technical Seminars are one and two-day, intensive seminars in cities nationwide covering the latest networking technologies. All of our seminars are also available for

customized on-site training. For complete and immediate information on our current seminar offerings, dial our instant fax-back service at 800-756-9430 from your touch tone phone or call a seminar representative at 800-643-4668.

*Our instant fax-back service delivers information on many of these products. Dial 800-756-9430 from your touch tone phone and use the appropriate document code to have information faxed right back to your fax machine!

NetDraw

software. At your fingertips, you will find over 1,100 full color, vendor specific network images in the areas of LAN's, WAN's, internetworking, personal computing and much more! New product features in NetDraw Plus v2.0 include "Smartdrawings" with built-in connect points, "Drag and Drop" drawing, multi-layered hierarchical diagramming and customizable image libraries. Call 800-643-4668 to order your copy today! Or get immediate fax-back information by dialing 800-756-9430 and request document code #10.



Publicize your press coverage in Network World by ordering reprints of your editorial mentions. Reprints make great marketing materials and are available in quantities of 500 and up.

To order, contact Reprint Services at 612-582-3800 or 315 5th Ave. N.W., St. Paul, MN 55112.

MCI

Continued from page 1

access, driven by an overloaded network, that ruffled many downstream Internet service providers' (ISP) feathers (NW, April 29, page 10).

"We got caught with our pants down because our crystal ball was quite murky" about the growth of the Internet, said Leslie Aun, an MCI spokeswoman. She indicated that the new upgrade is designed to keep that situation from happening again.

"But now, MCI is going to be donning pants that are many sizes too big for them" and capacity is likely to sit idle for some time, observed Christine Heckart, director of broadband at TeleChoice, Inc., a consulting firm based in Verona, N.J. That's because the traffic load demanded of the company is not even in the OC-12 ballpark yet, she said.

Aun said MCI found money in other parts of the company to finance the project. Given that MCI has not delivered on many of its announced services in the past several months, such as SNA over frame relay and high-speed frame relay, some analysts questioned whether MCI is making good use of its funds for capacity that will not be used for some time.

Still, "they probably can't move fast enough" when it

comes to the Internet, said David Goodtree, senior analyst at Forrester Research, Inc. in Cambridge, Mass. While MCI predicts it will do \$2 billion in Internet business in the year 2000, Forrester forecasts MCI's 'Net business to be twice that.

Thinking ahead?

MCI may also have multimedia on its mind. "Maybe they're thinking ahead to the real-time multimedia applications they'll be delivering through their relationship with Intel Corp." announced earlier this month (NW, June 17, page 12), said Steve Franco, senior analyst at The Yankee Group, a Boston consulting firm. Some of those services are due out early next year and will require very high speeds on a broad basis, he noted.

MCI is building the high-speed net in an era when the de facto backbone speed of nationwide service providers is 45M bit/sec (see graphic). Most other ISPs are targeting OC-3 speeds at the end of the year, Franco noted.

Aun said MCI has taken \$60 million from other parts of the company to finance Fore Systems, Inc. and Cascade Communications Corp. ATM switches, as well as Cisco Systems, Inc. rout-

ers. She declined to say what other services could be impacted by the funds transfer.

The first link to be boosted to OC-12 will be from Atlanta to Washington, D.C., with 18 other points of presence to soon follow.

MCI said it is also adding another 13,000 customer access ports, ranging in speed from 64K to 45M bit/sec.

'Net backbone designs

ISP	Platform	Speed (bit/sec)
BBN	Leased-line mesh	45M
MCI	Leased-line mesh/ATM	155M/622M
PSINet	ATM	45M
Sprint	Leased-line mesh	45M
UUNET	Frame relay	45M

Aun said the OC-3 upgrade "has already brought us a lot of breathing room, and we would be fine until the end of the year" with that capacity. Still, all may not be perfect in paradise: Some MCI customers report persistent points of congestion, even in the 155M bit/sec backbone.

"Things have gotten much better; there are no real terrible bottlenecks like before," said Bob Hoquim, president of IQuest, Inc., a downstream ISP that has been affected by MCI congestion in the past. "But the network is still saturated in some areas." ■

Andrew

Continued from page 1

"With ATM losing favor, especially as a wide-area option, frame relay is a strategic way for users to gain a multiprotocol, higher bandwidth WAN," said Anura Guruge, an independent analyst based in New Ipswich, N.H. "The Andrew product is an inexpensive solution and will make private frame relay networks more affordable."

Swissair flies into frame

The box's cost and ease of use are two reasons Swissair in Melville, N.Y., selected SwitchLynx/FR. Swissair was a beta site and purchased the boxes before they were publicly available.

"We aggregated our remote frame relay links to the switch, which helped drive costs down," said Tomas Lora, network manager for Swissair. The company installed five switches in building a private frame relay net. "We evaluated some other switches, but none would have given us the return on investment the SwitchLynx will."

While anchoring a private

frame relay net is the switch's primary market, it can also act as a concentrator for devices that need access to public frame relay nets. This eliminates the need to have a single public access link for each device.

Physically, SwitchLynx/FR is

Frame relay switch comparison

Vendor	Product	Price
Andrew	SwitchLynx/FR	\$5,995 (4 ports); \$6,995 (8 ports)
Cascade	6-port STDx	About \$17,000
StrataCom	IPX 8-port model	\$15,000

a cut-through device, available in four- or eight-port models supporting 11M bit/sec of throughput. The ports can support a maximum of E-1 speeds.

Cut-through switches enable data to flow uninterrupted from an output port on one device to an input port on another. Both ports need to be operating at the same speed, however, and if they are not, SwitchLynx/FR will automatically switch to a store-and-forward mode.

Synchronous Data Link Control or High Level Data Link Control devices such as IBM

3174 controllers supporting SNA traffic can link directly to SwitchLynx/FR. LAN-attached devices, however, must connect via a bridge or router.

SwitchLynx/FR supports voice and video via a suitable frame relay access device.

Learning the name Andrew

Observers noted that the greatest challenge for Andrew could be getting its name known to more users. While Andrew has been a good-size player in the token-ring and wireless markets, this is its first venture outside those markets.

"We are working to have a larger presence in the WAN arena, and we'll be doing more. This is only a first step," said Greg Koss, vice president and general manager of networking products at Andrew.

©Andrew: (800) 328-2696.

NetTech

Continued from page 1

them more efficiently handle troubleshooting, capacity planning and service-level tracking, NetTech officials claimed.

EView/SMS works by having EView agent software tap the SMS component running on an NT Server. The agent then feeds system data, such as configuration, CPU utilization and connectivity data, back to an EView application running on the OpenView manager.

The key benefit, NetTech said, is scalability. "SMS isn't scalable in large environments, and customers have had a hard time managing multiple servers, so we aim to change that," said Ellis Gregory, NetTech's chief executive officer.

One analyst concurred. "Microsoft would tell you how highly distributed SMS can be, but there is no central console to monitor a large NT environ-

until late this year at the earliest (NW, Feb. 5, page 6). Even then, Microsoft will still rely on proprietary protocols to monitor NT events, although it will include the ability to display SMS and SNMP data on one console.

The NetTech product will augment SMS and provide users with all of those functions, Gregory said. "EView will let users see multiple Windows NT domains, current configurations, disk utilization and other vital systems management data," he said.

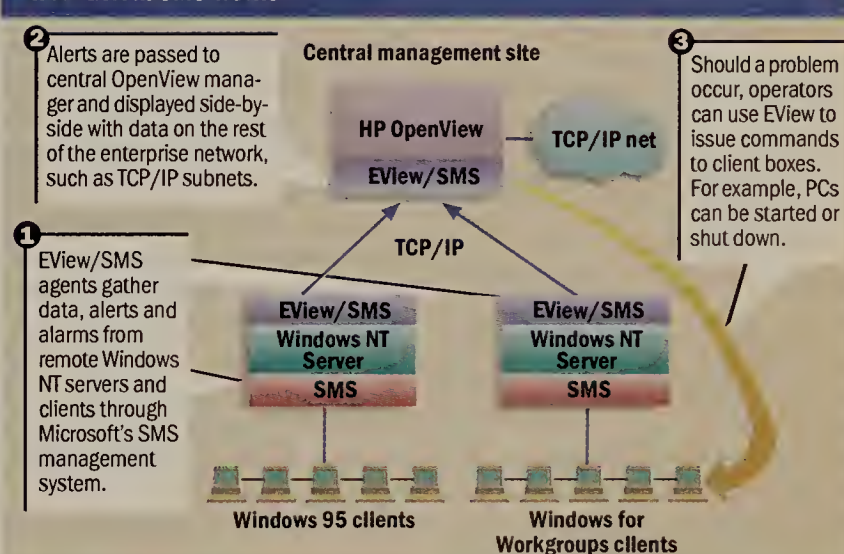
"SMS isn't scalable in large environments, and customers have had a hard time managing multiple servers, so we aim to change that,"

Gregory said.

Watching over AS/400

EView/400, on the other hand, operates much the same way as EView/SMS. The difference is that it uses agent software to gather system data from the Application System/400's operating system, OS/400, and pass it up to an OpenView screen. Administrators can then issue commands back.

How EView/SMS works



ment if you need one. But there aren't that many large NT environments yet," said Tim Wilson, a senior consultant with Decisys, Inc. in Sterling, Va.

Microsoft has been slow to enhance SMS and give it the ability to manage larger server-based enterprises. The company has made some movement toward helping users manage distributed NT servers via larger Simple Network Management Protocol-based managers, but it has not set the world on fire doing so, analysts said.

For example, according to Microsoft, some SNMP support will be added to SMS 1.2 later this year. But true network management features, such as the ability to autodiscover network devices and reconfigure downstream routers, will not come

When IBM bought Tivoli earlier this year, it came out with a road map of how their product lines would be integrated in the future and only one AS/400 management product was included.

"AS/400 management products were clearly left out of the IBM/Tivoli TME 10 road map, so those users are clearly in need of this kind of help," Wilson said.

Pricing for EView/SMS and EView/400 have not been finalized. Both products should be available by August.

©NetTech: (919) 781-7887.

COMMENTS?

See "How To Reach Us" on Page 6.

Lotus

Continued from page 10

Domino 1 provides a combined HTTP server atop a Notes server, and allows users to open and edit documents on a Web site from within Notes.

Both Domino 1 and Domino II servers are aimed at moving Web applications beyond simply publishing static data on the Internet to include discussions and even full-blown groupware capabilities.

For instance, Domino may be used to construct a customer service application that gives users access to billing information and a customer support knowledge base via Notes or a Web browser. Such an application could include built-in workflow that initiate electronic mail or faxes.

"Depending on how corporate America defines a Web server, an HTML- and HTTP-compliant Notes server is perhaps the most mature Web server out there," said Matt Cain, an analyst at META Group, Inc. in Stamford, Conn.

In addition to its 'Net push,

Lotus also showed off several offerings to improve Notes' ability to access and update data stored in legacy systems.

Also, a new LotusScript:Data Object allows Notes clients and

What's new with Notes

- ▶ Notes 4.5, a Notes/Web server hybrid due in Q3
- ▶ Enhanced IBM MQSeries link for Lotus Notes
- ▶ NotesSQL Release 2 and NotesPump Release 2 for updating Notes data from relational databases
- ▶ Oracle LotusScript for accessing Oracle7 databases using native Oracle protocols
- ▶ LotusScript Extension Toolkit for linking non-Notes applications to Notes

servers to access and update an open database connectivity-compliant database using LotusScript.

Lotus also rolled out the Oracle LotusScript Extension, software that lets Notes clients and servers read and write to Oracle databases using Oracle SQLNet protocols. ■

Windows 95

Continued from page 1

peeking at their system setups — and invading their privacy — when they registered with the Microsoft Network online service. Microsoft denied any wrong doing.

"You'd think after that debacle last summer when people thought [Microsoft] was accessing their data when they logged into the Microsoft Network for help that they would have learned their lesson," said one user, who requested anonymity.

Tex Norwood, division head for Desktop Systems and geographical information systems manager for the City of Fort Worth, Texas, said the city would not make use of AnswerStation. He wants systems problems to be handled by the city's IS staff and does not want end users arbitrarily calling for outside assistance.

Getting your hands on it

The Windows 95 revision is in limited technical beta testing and should be on retailers' shelves by year-end.

But Microsoft first will ship the code — dubbed the OEM Service Release 2 (OSR2) — this summer to its OEM partners so they can test the new features on their own hardware, said Phil Holden, a product manager in Microsoft's business systems division.

The new features will not be available as an add-on pack for existing customers, but Microsoft will provide some of them via the Internet.

Microsoft has said it will ship up to five OSRs before it releases the next major version of Windows, code-named Memphis, in late 1997 or early 1998.

Here are other highlights of OSR2:

■ Support for File Allocation Table-32 (FAT32), a file system enhancement that will give Windows 95 users access to large shared disk drives and dual CD-ROMs with upwards of 4G bytes of storage.

"We have been waiting for this type of hardware support," Norwood said, noting that the 700 end users on the network he oversees have been unable to directly access the large multi-gigabyte disk drives, which the city's Windows NT Servers support.

"We have this beta up on 30 clients, and to have those clients finally recognize that available disk space is just great," he said.

■ Interrupt Requester sharing, which allows multiple PC cards to access a single interrupt at the

same time. This is useful for Windows 95 users installing high-speed network adapter cards, video cards, modems and other PC add-ons.

■ Support for faster 3.3 volt PC cards, including network adapters and modems. Both end users and network managers can now power-off these cards when they are not in use.

■ A built-in copy of Internet Explorer 3.0, Microsoft's Web browser.

■ It will retain the Universal Inbox for electronic messaging, but the name is being changed to the Windows Messaging System.

■ OSR2 also includes all the elements of the Windows 95 service pack, which has been available to users via the Internet since December. Among these fea-

tures is a scanning technology licensed from Wang Laboratories, Inc. called Windows Imaging, and a redirector that allows access to Novell, Inc.'s Novell Directory Services tree. Other features include a 32-bit Data Link Control protocol stack that enables access to IBM mainframes and improved support for ISDN drivers, which is increasingly important for remote access.

"Basically, this new ISDN driver differs from the one shipped with Windows 95 in that it works," Holden said.

"With the last one, you basically had to tell it that it was an ISDN connection it was looking at. This new one has no problems whatsoever in going out and finding where the connection is," he said. ■

Client/server messaging

A new outlook on Exchange

By Barb Cole

New York

Microsoft Corp. last week provided details on a new mail client that is expected to become the de facto Exchange client for Windows 95.

The Microsoft Outlook desktop information manager — first discussed two weeks ago during Microsoft's daylong intranet briefing — incorporates electronic mail, calendaring and scheduling, contact management and file management.

The software will be included in the Office 97 application suite, sold as a stand-alone product by year-end and eventually bundled with Exchange, according to company officials.

Exchange client options

- ▶ Any MAPI-compliant mail client.
- ▶ Exchange In-Box: Built in to Windows 95 for reading and responding to messages; lacks advanced authoring and development features; being renamed Windows Messaging System.
- ▶ Exchange client for DOS, Windows and Macintosh: Full-blown client that ships with Exchange Server; includes full messaging and authoring.

Outlook: Windows 95-only client that is integrated with Microsoft Office; will ship year-end and is expected to supplant the Exchange client for users running Windows 95 or later generations of the operating system.

Outlook will provide a central interface in which Microsoft Office users may perform daily tasks and share information

easily between the word processing, spreadsheet and graphics applications that comprise the suite.

Outlook is also designed to address some of the limitations of the Exchange inbox that currently ships with Windows 95. Specifically, Outlook's calendaring features replace Schedule+, a separate package that does not work with Exchange.

"I'm itching to get my hands on [Outlook]," said Greg Scott, IS manager for the College of Business at Oregon State University in Corvallis, which is running the Windows 95 in-box as an Exchange client. In addition to featuring integrated mail and scheduling, he said Outlook will make Exchange easier to use by exposing its capabilities, such as the ability to apply a calendar view to data in the messaging server.

"One of the problems we have [with Exchange] now is that users don't always understand how to tap the potential of the product," he said. "When features are more on the surface, users will exploit them."

Because Outlook runs only on Windows 95, Microsoft will continue to sell the Exchange client for users running DOS, Windows 3.1 or Macintosh clients, according to Greg Lobdell, group product manager at Microsoft.

Analysts were enthusiastic about Outlook and said it will boost the collaborative capabilities of Exchange, while giving Office users the tight integration expected in a suite. ■

NetworkWorld

161 Worcester Road
Framingham, Mass. 01701-9172
(508) 875-6400

Periodicals postage paid at Framingham, Mass., and additional mailing offices. Posted under Canadian International Publication agreement #0385662. *Network World* (ISSN 0887-7661) is published weekly, except for a single combined issue for the last week in December and the first week in January by *Network World, Inc.*, 161 Worcester Road, Framingham, Mass. 01701-9172.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-820-7444.

Nonqualified subscribers: \$5.00 a copy; U.S. - \$129 a year (except Washington, DC, Utah and Florida \$136.74); Canada - \$160.50 (including 7% GST, GST #126659952); Central & South America - \$150 a year (surface mail); Europe - \$205 a year (surface mail), all other countries - \$300 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label from front cover of the publication.

Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106.

Network World is distributed free of charge in the U.S. to qualified management or professionals who meet ALL of the following criteria:

- 1) Have site purchasing influence.
- 2) Are involved in the purchase of network products and services.
- 3) Have multi-platform networks installed or planned (including network architectures, LAN operating systems and LAN environments).

PHOTOCOPY RIGHTS: Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by *Network World, Inc.* for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of \$3.00 per copy of the article, plus 50 cents per page is paid to Copyright Clearance Center, 27 Congress Street, Salem, Mass. 01970.

POSTMASTER: Send Change of Address to *Network World*, P.O. Box 3090, Northbrook, IL 60065.

Copyright 1996 by *Network World, Inc.* All rights reserved. Reproduction of material appearing in *Network World* is forbidden without written permission.



Reprints (minimum 500 copies) and permission to reprint may be purchased from Reprint Services, 315 5th Ave. N.W., St. Paul, MN 55112 (612) 582-3800. USPS 735-730

Tunneling

Continued from page 10

access server] has to be a Windows NT server. There's only one company that markets software for that," Brockmann said.

While both PPTP and L2F perform the same function, they are based on different underpinnings. PPTP must run over IP, while L2F is based on User Datagram Protocol (UDP) and can run over any transport.

With both schemes, traffic through the Internet is encapsulated into tunneling protocol frames that are stripped off once the frames have been accepted by the corporate server.

In the Microsoft scenario, the tunneling protocol is generated by the remote client. With L2F, the Internet service provider's (ISP) access server performs the encapsulation. In both cases, the corporate access server must run the tunneling software.

Security procedures can be performed by the ISP and the corporate server. Microsoft and Cisco are working on encryption to go with their schemes.

So far, no service providers have offered an Internet VPN service because the tools are not available yet. Microsoft will not issue PPTP support on Windows NT Server and NT Workstation until later this summer. Windows 95 will support it by year end. Cisco plans to roll out L2F in September. ■

Bringing the fun back into networking, whether the users like it or not

Networks are boring. Perhaps I should qualify that. Networks have become boring. There was a time when they were exciting and stimulating. They were once a challenge, demanding the very best from you, and you would go home at ridiculous hours of the night exhilarated with the knowledge that you had overcome great odds—or at least lousy documentation. Now you go home exhausted, knowing that you'll be fighting the same fires tomorrow and the next day and the next.

So, here at the Gibbs Institute of Terpsichore and Plate Juggling, we are working on ways to put the fun back into networking (which would spell "neftwurking," but no matter). Our thinking is that we don't care about users having fun—it is us professionals who need to get that ol' sparkle back. Torturing users seems as good a way as any.

Our first solution is to add humorous automatic announcement messages for the help desk. For example, "Hi, this is the Help Desk. Hello? Hello? Is anybody there? I can't hear you..."

Another winner is: "As part of our cost reduction program, the Help Desk can only answer alternate calls. Unfortunately, your call is one of those we will skip. Please try again in 10 minutes."

What else can we do? Well, how about building a shell for users that looks like Doom? Until they can find the VP of finance in the maze and shoot or axe him, they can't get into the accounting system.

Alternatively, make everyone play Multiuser Dungeons and Dragons to gain the right to access your network. Until users gain at least soldier status and acquire a dagger and one of the serpent's magic teeth, they aren't allowed to send "ready for lunch?" messages to their buddies over the network. Acquiring a purse of gold would allow them to use the accounts system, while getting the magic scrolls would give access to the printer, and so on. And don't tell users the rules: Make 'em guess.

Fix the start-up sound so all PCs play the national anthem, and convince human resources that not standing for

Set it up that any time the name of your corporation's president is typed, the words "Big Kahuna" are substituted.

the national anthem should be against company policy. Ensure that PCs reboot in rows across the office every half-hour on Tuesdays. Then make doing "the wave" on company time a disciplinary offense. Keep photos for reference.

Send random junior employees bogus E-mail messages from the president demanding their immediate presence in his office. Wire a hidden camera with a CUSeeMe reflector in the president's secretary's office, and ensure that technical support can tune in to watch the resulting farce.

Fix it so that PCs play a scream sound whenever disk space falls below 25%. Set up word processor macros so that any time the name of your corporation's president is typed, the words "Big Kahuna" are substituted.

Insist that all users pay a \$5 fine to a charity of your choice when they forget their passwords. Ensure that you kill their passwords at least once every other month.

Convince new hires that your PCs require a voice sample to authenticate their login. Tell them they need to repeat a word displayed on the screen very loudly and clearly after login. Use vulgar words.

Reroute random E-mail messages through a program that removes all vowels. Tell users who complain that it is because they started the E-mail program incorrectly. Ensure that you avoid explaining exactly what they did wrong. If they press you, tell them about the new voice authentication feature.

I see lots of happy times ahead.

Send your recipe for network happiness to mgibbs@gibbs.com or call him at (800) 622-1108, Ext. 504.



Mark Gibbs

Robots, spiders and broadcast technologies have their costs

If you work for the state of Michigan, your paycheck stub is about to become more depressing.

Michigan Gov. John Engler, a Republican, got the bright idea of teaching state employees how much it costs to keep them on the payroll. Starting this summer, pay stubs will detail the state's costs to comply with federal and state laws and regulations—about 10% of a typical employee's gross payroll allocation.

Engler wants to show employees the hidden costs of government. Other Republican-run states and several corporations plan to adopt this idea. (As profligate spenders, Democrats, of course, take a dim view of Engler's plan.)

Corporate networks, likewise, have hidden cost elements, which are incomprehensible to CFOs, irritating to CIOs, familiar to network managers and invisible to the average user. Controlling these costs is a difficult job poised to get worse.

The source of this brewing trouble is end users, blissfully browsing through millions of databases and documents on

mouseing.

No one has qualms about using robots in the right setting. Search engines, for example, use robots to build databases of information assets; the results are enjoyed by many people.

Some users, however, question the ethics of using robots in browser-based client applications. Automated search operations strain servers far more than simple document retrievals. This automation negatively affects performance for everyone using those servers, causing widespread tendinitis.

Network congestion can also stem from Internet broadcast technology, such as that used in the popular PointCast Network product. PointCast allows users to select information such as news, financial reports, sports results, weather forecasts and horoscopes, and have it automatically transmitted to their computers. Personalized broadcasts allow users to cut out all browsing.

Users like PointCast because the software and service are free (www.pointcast.com), paid for by advertisers. PointCast says it will top a million users by year-end. It claims 26 million hits a day, an activity rate second only to Netscape Communications Corp.

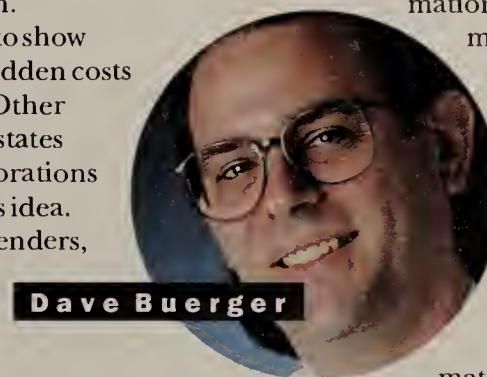
PointCast says most of its users select all options for broadcast reception because of the novelty. Reports of firewall congestion from excess traffic are surfacing, apparently because lots of users request hourly information updates.

PointCast denies this is a problem but is readying a server product to help cache frequent broadcast requests. The \$995 product also will allow corporations to broadcast company information to employees.

Congestion from technologies such as these that allow users to automate information location and retrieval is bound to rise. The dilemma is that organizations want to encourage creativity but must control the costs of information access.

Perhaps someone will invent a technical solution. Meanwhile, teaching users about the cost consequences of their actions and encouraging them to voluntarily regulate information retrieval might be the simplest way to avoid clogging the corporate intranet.

Buerger is a networking industry consultant and writer in Atlanta. He can be reached at dave@buerger.com.



Dave Buerger

A big issue is automated use of the Web, which is starting to challenge overall performance and push up system costs.

intranets and the World-Wide Web. Network and Web server congestion is skyrocketing.

At least that's the apparent problem. A bigger issue is automated use of the Web, which is starting to challenge overall performance and push up system costs.

One technology that facilitates automated browsing is software agents variously called robots, spiders, Web wanderers, Web crawlers and Web worms. The names sound icky but the technology provides wonderful results.

A robot is a software program that traverses the Web's hypertext structure, retrieving all documents that match a designated specification. Robots save users time; information junkies avoid serious bouts of tendinitis from excess

HOW WILL THE LAUNCH OF MID-RANGE COMPUTING? LET'S JUST

The Compaq ProLiant 5000 has arrived. And it's going to change everything that lies in its path. Including how you think about mid-range computing.

The ProLiant 5000, with its Pentium® Pro processor, delivers unprecedented performance for mid-range solutions.

But that's just the first half of the story.

In today's client/server environment, you need

more than power—you need control. So we've combined the Pentium Pro processor with a concept we're calling Integration Management. Giving you new tools to manage your system throughout its entire life cycle.

Improvements to SmartStart now let you set up an Integration Server, which basically serves as a holding tank for all your software. It also simplifies the setup and maintenance of your network. All you have to do is configure your Integration Server and then, using SmartStart, deploy it across your entire network. It not only ensures consistency across

all your network servers, it saves you a lot more than just shoe leather.

Maintaining your network is easier now, too. Thanks to some cool new features on Compaq Insight Manager, you can get updates and new software revisions via the Internet, your modem or CD. And then

transfer them to the Integration Server just one time. You can even maintain your network

when you're away from the office. All you need is your notebook and a phone line.

We've also partnered with the industry-leading companies of system management applications. So now you can view your entire network in one place. Together, these and other improvements have helped reshape the landscape of mid-range computing, by creating the most manageable server in the industry. To find out more about the ProLiant 5000, visit our Web site at www.compaq.com, or call us at 1-800-315-7772. It's not just a server. It's a force to be reckoned with.

System	tpmC	\$ per tpmC
ProLiant 5000 6/166 M2	5676.93	\$135
HP 9000 Server T500	5621.00	\$380*
WorldMark 5100S	5607.00	\$394
SPARC center 2000E	5124.21	\$323
HP 9000 Model K420	4939.11	\$232
IBM RS/6000 J30	3631	\$289

*A lot of companies claim to offer the lowest cost of ownership. But we have the benchmarks to prove it.**



© 1996 Compaq Computer Corporation. All rights reserved. Compaq registered U.S. Patent and Trademark Office. ProLiant, SmartStart, and Insight Manager are registered trademarks of Compaq Computer Corporation. The Intel Inside Logo and Pentium are registered trademarks and the Pentium Processor Logo and the Pentium Pro Processor Logo are trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. *Published TPC-C results as of 6/96. The TPC-C test is a transaction-oriented OLTP environment. †Results withdrawn as of 4/17/96. In Canada, we can be reached at 1-800-567-1616.

THE PROLIANT 5000 AFFECT
SAY ITS CODE NAME WAS "HURRICANE."

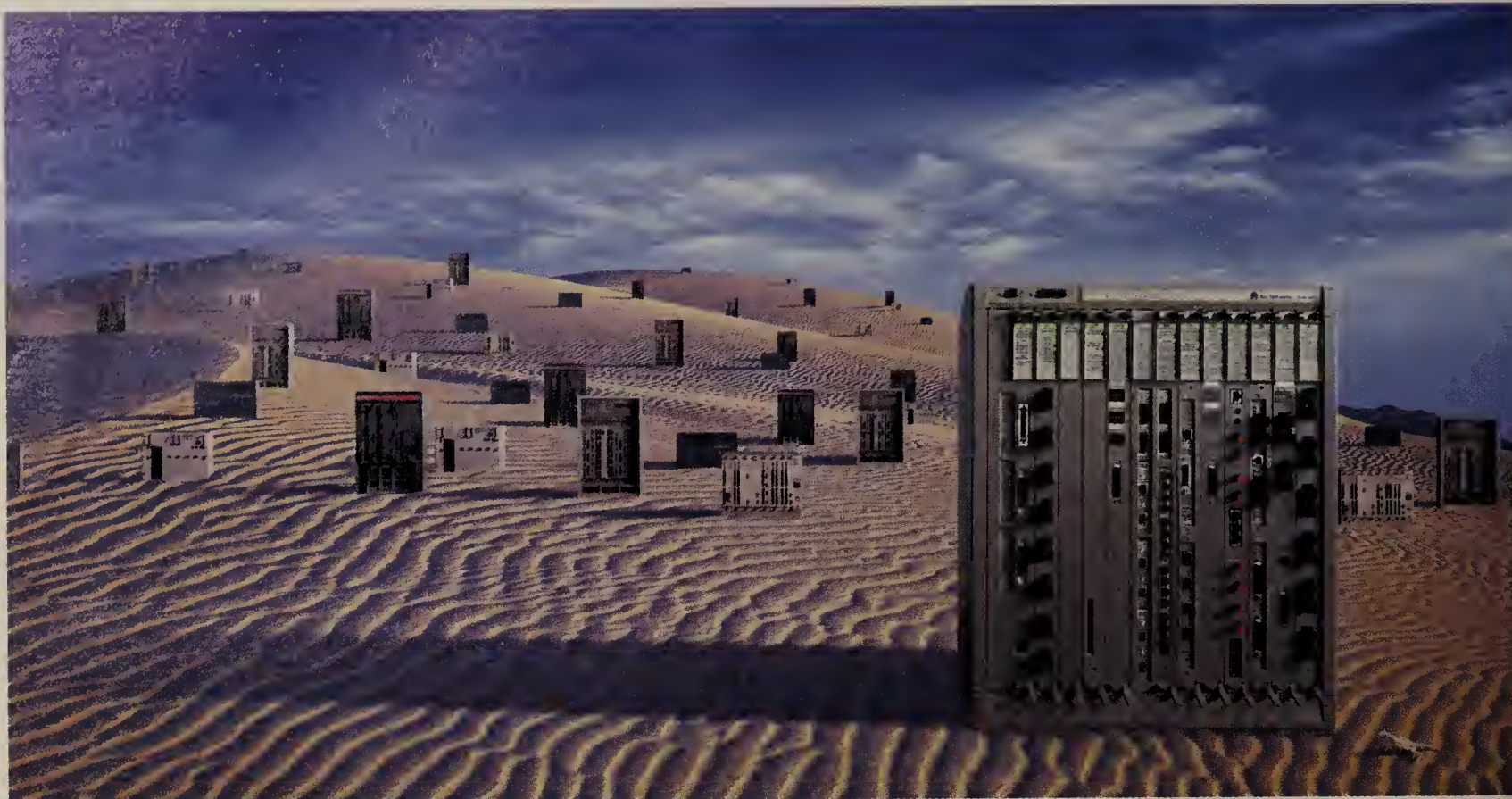


Introducing the ProLiant 5000.

COMPAQ

Has It Changed Your Life Yet?

Less Is More.



You can buy standalone network products forever.
Or get the System 5000 today.

Bay Networks System 5000™ simplifies networking by integrating technologies in a single platform. Integration means savings and flexibility. Plus, more management control over your network with Optivity®, the industry's leading network management solution. Best of all, the System 5000 lets you easily move from Ethernet switching today to ATM switching tomorrow. Call 1-800-8-BAYNET ext.136 for a free guide to switched internetworking, or see it online at www.baynetworks.com/more.



Shared Media & Configuration Switching

Ethernet
Token Ring
FDDI

LAN Switching

Ethernet
Fast Ethernet

ATM

Switching
Virtual Network Routing

LAN Routing

Ethernet
Token Ring
Fast Ethernet
FDDI

WAN Routing

ISDN
Frame Relay
Leased Line
X.25
SMDS

Remote Access & Communications Services



Optivity®. The leading network management solution.

© 1996 Bay Networks, Inc. "People connect with us" is a trademark of Bay Networks, Inc.



Bay Networks
People connect with us

CONFERENCE AT - A - GLANCE

MONDAY, SEPTEMBER 9, 1996

9:00-5:30 Pre Conference Seminars: Using The Internet To Target Your Prospects - D. Radin, D. Kosoglow
Totally Unplugged: An In-Depth Look At Wireless Technologies And Business Applications, I. Brodsky
ISDN - The Basics And Beyond - T. Cross
The Glue At The Crossroads: Mobile, Wireless And The Internet - T. Schmidt

TUESDAY, SEPTEMBER 10, 1996

	Extending The Enterprise: Bringing The Corporate Network To New Locations	Working On The Web: Internet & Intranet Strategies	Mobile Solutions: Supporting The Unplugged Worker	Issues & Answers: The Latest Technologies
7:00-8:30	Conference Registration			
9:00-9:50	Event Chair Address: Power To The People: Rethinking Corporate Information Priorities - T. Nolle			
10:00-10:50	Chairmen's Addresses: Remote Access Infrastructure: Strategically Extending the Enterprise - V. Sribar Remote Enabling Applications: "The Holy Grail" - M. Rothman			
11:00 - 11:50	Chairmen's Address: Messaging On The Intranet: The Great Convergence - D. Blum and G. Rowe			
12:00-1:30	Lunch Break			
1:30-2:20	PANEL DISCUSSION Remote Control Vs. Remote Application Services Vs. Remote LAN Access Panel - J. Gallant	Using A Web Browser To Access Information - P. Byrne	PANEL DISCUSSION Wireless Access To The Internet - I. Brodsky	Videoconferencing: Do You Need Virtual Workers? - P. Moynahan
2:30-3:20	Advanced Services For Remote Access - T. Nolle	Lotus Notes And The Internet - A. Mahon	Authentication And Encryption - J. Geary	Intelligent Remote Access To Legacy Systems - T. Manocha
3:30-4:20	Telecommuting Cost Analysis & Organizational Mgmt. Issues - T. Cross	Intranets: The Future Of Collaborative Computing - G. Brooks	CDPD - The Mobile Answer? - T. Schmidt	Virtual Office: Options And Issues - N. d'Arbeloff

WEDNESDAY, SEPTEMBER 11, 1996

8:30-9:20	Selling Remote Access/Mobile Computing To Upper Management - T. Nolle	Firewalls And The Future Of Internet Security - G. Lebovitz	PANEL DISCUSSION New Technologies For Mobile Computing - T. Bajarin	PANEL DISCUSSION How Many Vendors? The Single- Source Dilemma - J. Gallant
9:30-10:20	Remote Access: The ISDN Solution - S. Kelly	Java And Wireless Communications - K. Wilson	PANEL DISCUSSION Wireless Data: Still Unplugging Away - B. Frezza	Data Collaboration Standards: The T.120 Story - N. Starkey
10:30-11:20	Keynote Presentation: Remote Access And The Virtual Corporation - C. Calisi			
11:30	EXPO OPENS			
12:00-2:00	Lunch Break & Visit the Expo Floor			
1:00-1:50	Technology Briefings			
2:00-2:50	Telecommuting: Taking IT Home - M. Kosanovich	The Internet Meets The Telephony World - D. Latham	Taking the Internet/Intranet Mobile - T. Schmidt	PANEL DISCUSSION Internet Telephony - B. Frezza
3:00-3:50	Expo Time			
4:00-4:50	Keynote Presentation: The Virtual Intranet For The 21st Century - D. DeAngelo			
5:00-6:00	Expo Time			

THURSDAY, SEPTEMBER 12, 1996

8:30-9:20	Remote Application Management - C. King	Dial Access To The Internet And Frame Relay/ATM Corporate Nets - P. Alexander	Extending Applications To The Edge Of Your Network - M. Santiago	PANEL DISCUSSION Notebooks: The Road Warriors' Ultimate Tool - B. Goldenberg
9:30-10:20	Keynote Presentation: Turning The Power Of The Web Inward: Intranets - J. Lindner			
10:30	EXPO OPENS			
11:00-11:50	Technology Briefings			
12:00-1:30	Lunch Break & Visit the Expo Floor			
1:30-2:20	Keynote Presentation: Supporting The Unplugged Worker With CDPD Services - B. Hirsh, pg 3			
2:30-3:20	Controlling The Cost Of ISDN Remote Access - G. Daniello	Remote And Mobile Computing On The Internet - S. Jajeh	Key Security Solutions - D. Morris	
3:30-4:30	Expo Time			
4:30	Closing Address			

FRIDAY, SEPTEMBER 13, 1996

9:00-5:30 Post Conference Seminars: Business Approach To An Internet Strategy - D. Shimberg
Migrating to ATM - A Technology Overview - H. Van Norman
Understanding The Java Phenomenon - D. Mezick, S. Hillier

Each conference track takes you from benefit assessment, through alternative approaches, to implementation. Included are real-world, focused solutions to the issues which are most critical to you, your business and your network.

- Connect Your Work Force for the Best Competitive Advantage
- "Plug-in" Your Unplugged Workers
- Make Your Current Remote Access Strategy Better and Cheaper

Take part in the many interactive panel discussions spread throughout the program. You will gain valuable insight and advice on which solutions are right for you.

Call (508) 470-3880
to register or
complete and mail
the card below.

- ☐ YES! Send me a FREE Conference Brochure (5481)
☐ YES! Register me for the FREE Network World Unplugged Exposition (5571)
☐ Send me information on Exhibiting at Network World Unplugged

1. FAX this card to DCI at (508) 470-0526
2. MAIL this card to DCI

3. EMAIL * to ConfReg@dcexpo.com
4. WWW at URL <http://www.DCexpo.com/>

Name _____
Title _____ Mail Stop _____
Company _____
Address _____
City/State/ Zip _____
Phone () _____ Fax () _____
E-Mail Address _____

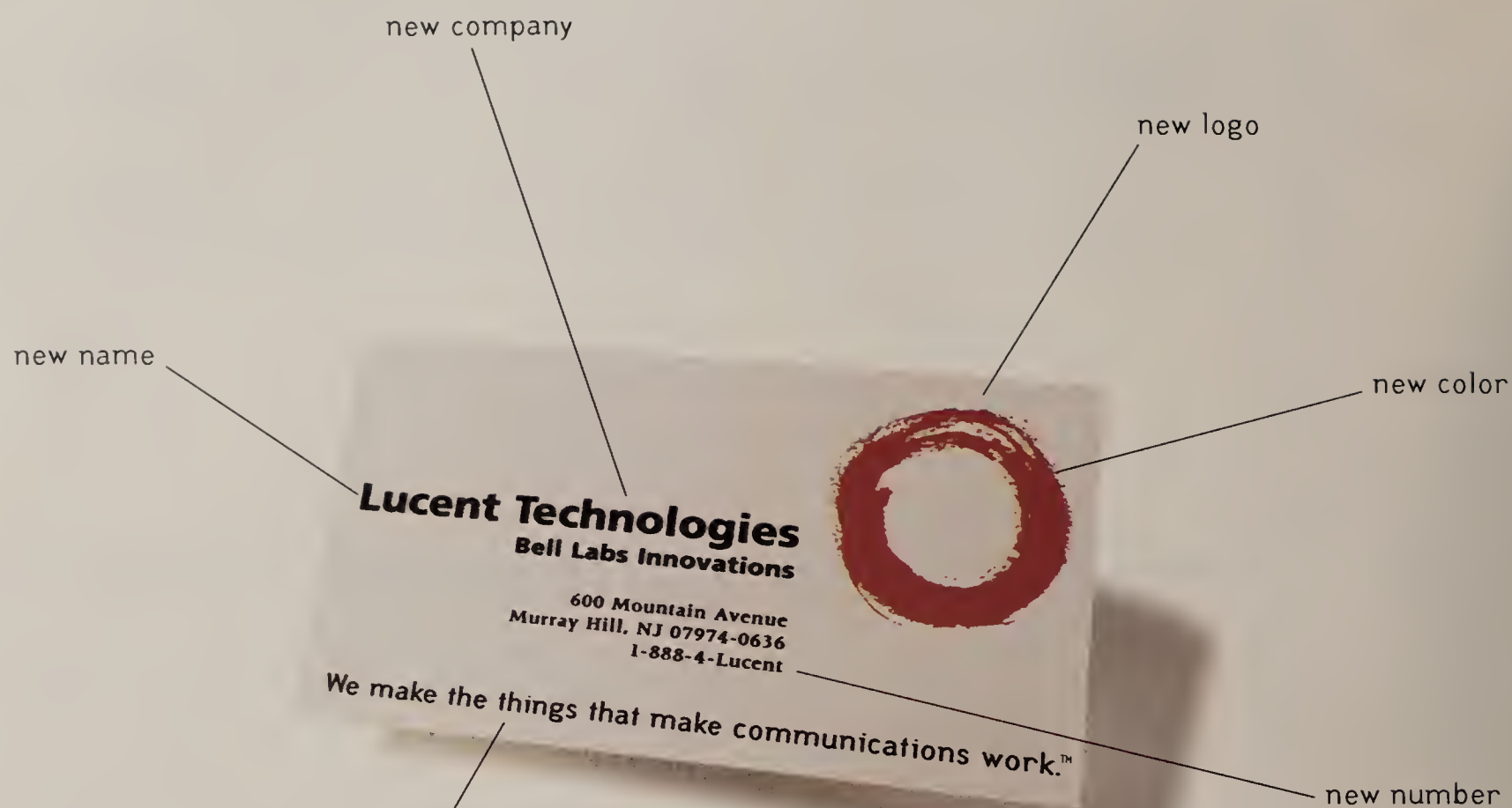
* When responding by EMail, please refer to your customer code QQAWN07 and Network World Unplugged (5481) in the subject line.
Include your name, title, company, conventional mailing address, including mail stop, phone and fax numbers.

QQAWN07

Tear off at perforation, fold in half at this line and seal.

Network World Unplugged
DCI
204 Andover Street
Andover, MA 01810

Place
Stamp
Here



(former systems and technology businesses of AT&T, plus Bell Labs, with 125 years experience in making the things that make communications work)

NetworkWorld UNPLUGGED

ALL NEW PROGRAM

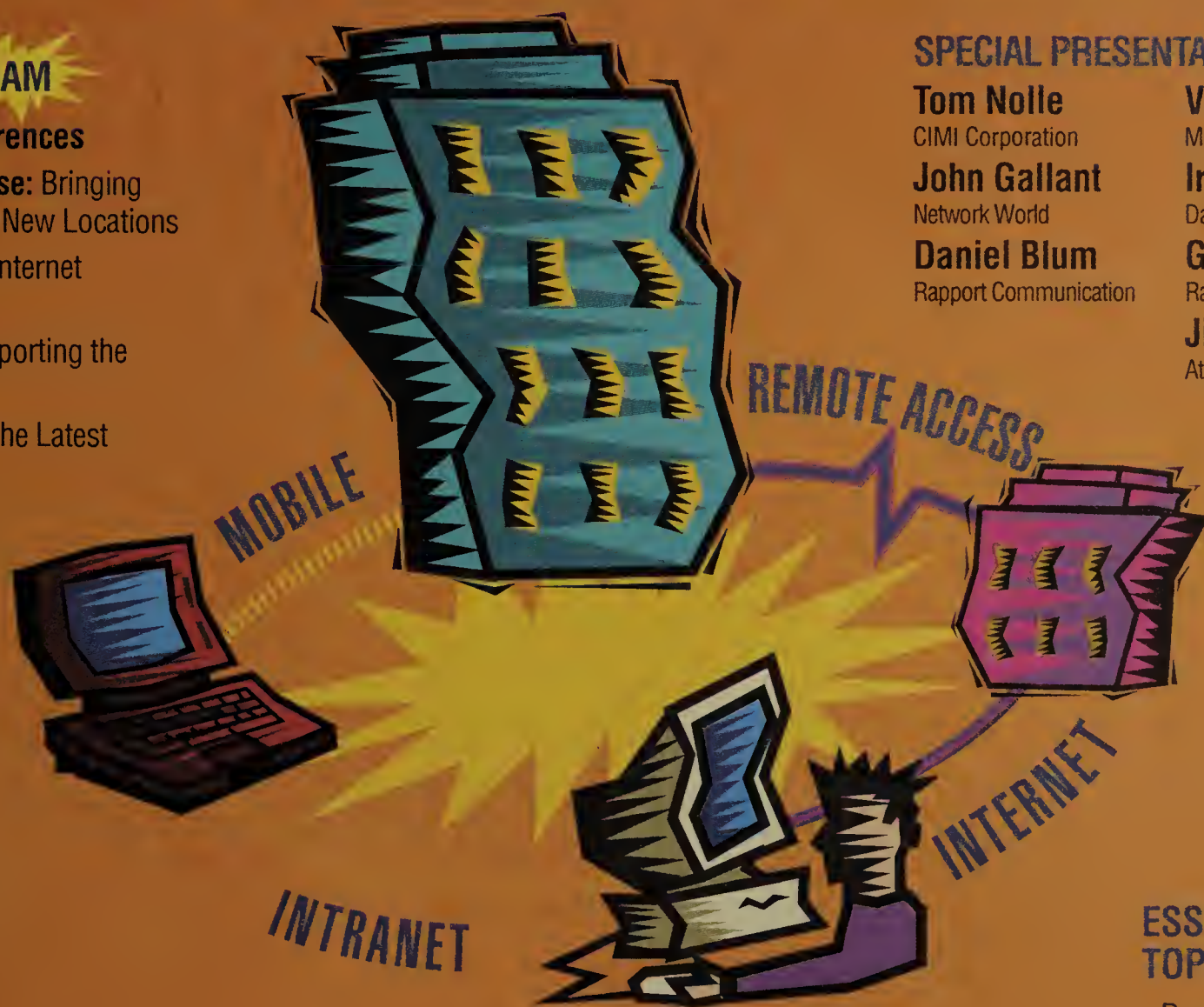
Four Focused Conferences

Extending the Enterprise: Bringing Corporate Networks to New Locations

Working on the Web: Internet & Intranet Strategies

Mobile Solutions: Supporting the Unplugged Worker

Issues and Answers: The Latest Technologies



SPECIAL PRESENTATIONS:

Tom Nolle

CIMI Corporation

John Gallant

Network World

Daniel Blum

Rapport Communication

Val Sribar

META Group

Ira Brodsky

Datacomm Research Company

Gary Rowe

Rapport Communication

Jim Lindner

Attachmate

ESSENTIAL TOPICS COVERED

- Remote Site Connectivity
- Internet Tools & Strategies
- Networking Options
- Remote Database Access
- Security Issues
- Wireless Technologies
- ATM
- Intranet Strategies
- ISDN
- Telecommuting
- Frame Relay
- Management Support
- SOHO (Small Office, Home Office)
- And More!

Produced by

NetworkWorld



**SEPTEMBER 10-12, 1996
BOSTON, MASSACHUSETTS**

Co-Sponsored by



© **Bell Atlantic** **NYNEX** Mobile



See over 100 of the latest remote access, wireless and Internet technologies - all under one roof!

**EXTENDING THE CORPORATE
NETWORK EVERYWHERE**

Call (508) 470-3880 for more information and a FREE Brochure.

NetworkWorld UNPLUGGED

SEPTEMBER 10-12, 1996 • BOSTON, MA

We have brought together an elite group of **INDUSTRY EXPERTS** with a proven track record in providing superior education. Among them are:

TOM NOLLE

President, CIMI Corporation,
Conference Chairman

JOHN GALLANT

Editor-in-Chief, Network World

VAL SRIBAR

Vice President and Service Director, META Group

IRA BRODSKY

President, Datacomm Research Company

BILL FREZZA

President, Wireless Computing Associates, Inc.

Armed with the knowledge you learn from the conference, you will have an opportunity to visit with the key industry vendors at the Network World Unplugged Exposition. See over 100 of the latest and greatest remote access, mobile, wireless, Internet products and services in action.

For more information and a FREE brochure, call (508) 470-3880 or EMail to ConfReg@dciepo.com. Be sure to mention your customer code QQAWN07.

To exhibit call (508) 470-3870 or EMail to 104130,540@compuserve.com

If you're like most companies today, much of your contact with customers takes place in remote office locations. Over 70% of your sales territory expansion involves the addition of a small field office, often in the salesperson's home. Your business depends on people who sit at the very fringe of your company's network.

Based on these statistics, the most pressing information problem you have today is – *getting corporate information to the people who really need it*. Every company recognizes how impor-

tant information is to its workers, and NETWORK WORLD UNPLUGGED provides you with the knowledge and capability to get these workers, the small remote office worker and the "Road Warrior," connected better, easier and more cost effectively.

The four pivotal tracks are –

- 1 Extending the Enterprise: Bringing Corporate Networks to New Locations.** This track focuses on empowering remote branch offices and small office, home office (SOHO) workers.
- 2 Working on the Web: Internet & Intranet Strategies.** If you want to get the most out of the Internet in supporting remote sites and mobile workers, or build your own Internet-like corporate information network, this track's for you!
- 3 Mobile Solutions: Supporting the Unplugged Worker,** deals with the REALLY unplugged, the mobile worker who must rely on public dial facilities or even wireless technology.
- 4 Issues and Answers: The Latest Technologies.** A variety of fast-paced head-to-head debates between industry experts and vendors on what's best in remote access and futuristic technology presentations that will take you over the edge.

NETWORK WORLD UNPLUGGED is the only industry conference dedicated to the problems of remote and mobile access to corporate information. Here's a small sample of the topics covered:

- Want 128 kbps of remote access bandwidth? ISDN may be your answer. With data compression, ISDN can offer your remote workers as good a connection to corporate information as some LANs provide.
- Looking for a new approach to building corporate information distribution applications? Sun Microsystems' Java language lets your software run on PCs, UNIX workstations, and Macs. Applications can be stored on your servers and downloaded as needed.
- Is your remote access opening a door to your private resources that anyone can walk through? Security and firewalls are a critical part of remote access, but one that is all too often ignored.
- Are Internet tools like HTML and Web browsers an effective way of distributing information? We'll talk about the policy issues and the tools you can use.
- How are you going to manage all of this? Networks that can't be supported can't be used. We'll talk about management systems and policy issues to help you get the most out of the technology and services you buy.

CHECK OUT THE INSIDE BACK COVER FOR MORE DETAILS!